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Engineering
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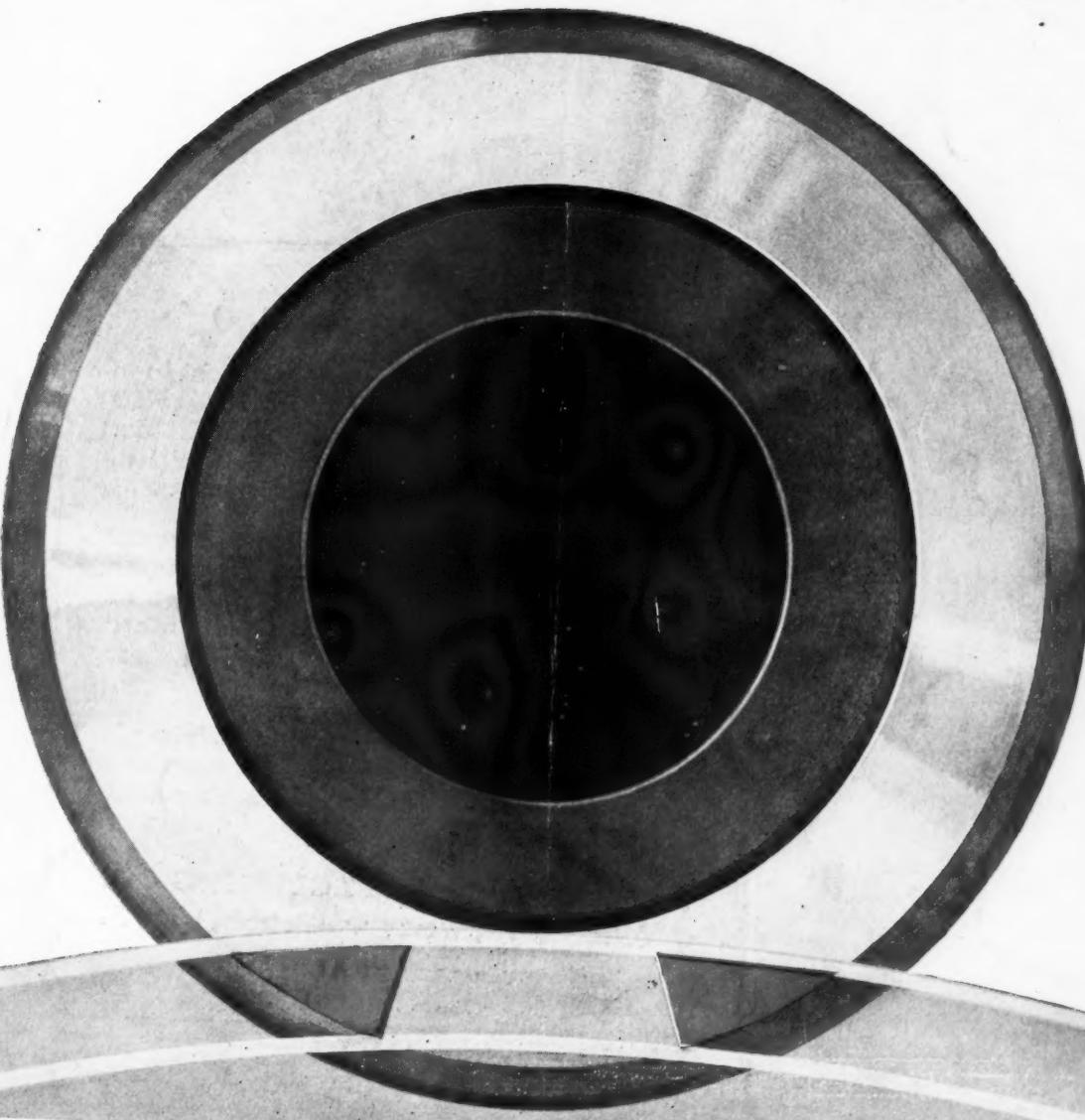
S. A. E. Annual Issue
FEB 9 1926

AUTOMOTIVE INDUSTRIES

Vol. 54
Number 5

PUBLISHED WEEKLY AT CHESTNUT AND 56TH STS.
PHILADELPHIA FEBRUARY 4, 1926

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AUTOMOTIVE INDUSTRIES

VOLUME 54

Philadelphia, Thursday, February 4, 1926

NUMBER 5

Annual S.A.E. Meeting Rich in Ideas

Gathering at Detroit one of the most fruitful ever held.

*Attendance over 900. Horning gives farewell
talk and Little assumes presidency*

By Norman G. Shidle

HIgh spots of interest to the whole industry were so frequent at the annual meeting of the Society of Automotive Engineers, which closed in Detroit, January 29, as to form a veritable mountain range of new ideas. Here are some of the more important:

Car manufacturers were severely criticized for failure to provide lighting equipment of sufficiently good quality and for failure in some cases to give correct information in instruction books as regards methods of lamp adjustment.

Color—one of the chief developments in connection with car bodies in the last three years—was shown to be a sales asset in the country as well as in the city, while demonstration was made of how permanency in color now can be obtained without limiting within narrow range the colors desired.

A homeopathic method of meeting the oil dilution problem was presented by R. E. Wilson, Standard Oil Co. of Indiana.

Superchargers and steam cooling, topics which have been discussed at engineering gatherings for a number of years, gave promise of being nearer to the commercial stage than ever before. Particularly does this seem true of vapor cooling, if the opinions, both formal and informal, of engineers at this meeting are indicative of probable trends.

It was generally agreed that brakes squeal too much, but no such unanimity as to cause existed.

Rather strong desire on the part of production men to get as great a proportion of workers as possible on some incentive form of wage payment was evidenced.

Strong difference of opinion as regards the relative merits of the all-metal and the fabric-metal construction for airships developed between Ralph H. Upson, Aircraft Development Corp., and Dr. Carl Arnstein, Goodyear Zeppelin Co.

The four-day session, which was held in the General

Motors Building, drew an attendance of well over 900 and exceeded last year's attendance by over 100. Probably no meeting of the Society in recent years has provided so high a level, both of papers and interest throughout its entire length, as did the gathering just closed. At only two or three of the thirteen sessions were there less than 250 people, while several of the discussions drew in excess of 300. The Carnival, which was held at Oriole Terrace on Wednesday evening, was attended by more than 1100 members and guests.

Making his inaugural address at the business session on Tuesday evening, incoming President T. J. Little, Jr., urged that engineers be brought into the industry through the mechanical divisions that they may get some practical experience before entering the office of the engineering department itself.

The Need for Trained Men

Speaking briefly of the need for trained men, Mr. Little pointed the way to an interest in education of young men for automotive work which may well be developed further by the industry. He reiterated the statement made in his talk at the annual dinner in New York a few weeks ago regarding the necessity of finding means to decrease the fuel waste which now takes place in the exhaust and in the radiator and water jackets.

A net increase in membership of 245 for the year 1925 was recorded by Harry L. Horning in his farewell talk as president of the Society. Membership now totals 5594, Mr. Horning said, while increased interest in section meetings has been manifest throughout the year. Publication of the safety code was the greatest achievement in aeronautics last year, Mr. Horning said, while he voiced his opinion about fuel supply in the statement that "There will be no shortage of fuel as long as scientists and engineers live."

Conflict of opinion, that powerful force for the generation of new ideas, was common during the various

sessions, while more than one engineer or visitor criticised quite frankly designs or methods now in use in the industry. William L. Dill, Motor Vehicle Commissioner of New Jersey, for example, told the engineers at the Headlight Session that examination by his investigators of a large number of cars leaving a large assembly plant in the East showed that 88 per cent of the cars did not have their headlights properly adjusted.

An Argument on Airships

Dr. Arnstein, commenting on Ralph H. Upson's paper on all-metal airship development, said, among other things, that the all-metal ship would be unsafe in lightning storms, to which Mr. Upson replied with statements from several eminent authorities on the subject of lightning to the effect that there would be no danger to the all-metal ship under such conditions. This was only one of about twelve or fifteen specific points on which Dr. Arnstein criticised Mr. Upson's designs and concerning which Mr. Upson replied to Dr. Arnstein.

Causes and remedies for brake squealing developed a large number of conflicting views, while the Standards Committee meeting threatened to drag on indefinitely as members expressed their opposition or approbation of the recommended standards proposed for adoption. Only one standards proposal, however, finally failed to be passed, that on oversize piston ring standards.

The session on motorcoach design, at which Gordon Lee of Fageol and A. F. Masury of Mack spoke, also developed differing views on current problems.

Indications that superchargers are nearer to commercial application than ever before were involved in the statement made by Fred S. Duesenberg that he believes the chief function of the supercharger to be in better atomization and distribution of fuel at low speeds. Better high speed performance, Mr. Duesenberg believes, can be taken care of by improvement of valve mechanism and in manifolding.

In addition to the discussions which aroused difference of opinion, a number of others simply brought to the engineers a wealth of new information. Among the other topics were research, engine design, fuels and lubrication.

Following are the committee appointments for the year 1926, which have been made by President T. J. Little, Jr.:

1926 Administrative Committees

Sections Committee

| | |
|--------------------------|-----------------------------------|
| J. H. Hunt, Chairman | (member at large) |
| J. W. White, Buffalo | E. P. Warner, New England |
| T. Milton, Chicago | W. S. James, Northern California |
| E. Wooler, Cleveland | Walker Gilmer, Pennsylvania |
| V. G. Apple, Dayton | Eugene Power, Southern California |
| G. L. McCain, Detroit | A. W. S. Herrington, Washington |
| George Briggs, Indiana | R. E. Plimpton (member at large) |
| C. B. Veal, Metropolitan | W. C. Keys (member at large) |
| F. M. Young, Milwaukee | |

The Chicago Show

AN unusually aggressive selling campaign on the part of virtually all exhibitors was one of the outstanding features in connection with the opening of the annual Chicago Automobile Show last week. A report of this event will be found on Page 193 of this issue with supplementary details in the News Section.

Membership Committee

| | |
|------------------|--------------------------------|
| H. M. Crane | H. L. Horning, Chairman |
| J. F. Winchester | H. E. Coffin John N. Willys |

Publications Committee

| | |
|------------|-------------------------------|
| W. E. Lay | E. P. Warner, Chairman |
| L. C. Hill | John Younger S. W. Sparrow |

Meetings Committee

| |
|---|
| L. C. Hill, Chairman |
| Carl Breer and F. E. Watts, Passenger Car |
| A. W. Herrington, Summer Meeting, etc. |
| C. O. Guernsey and J. F. Winchester, Bus, Truck, Railcar. |
| W. B. Stout, Aviation. |
| O. W. Sjogren, Farm Power |
| C. E. Summers, Research |
| V. P. Rumley and R. R. Keith, Production. |
| H. O. K. Meister, Entertainment. |

Constitution Committee

| |
|------------------------|
| A. J. Scaife, Chairman |
| H. M. Crane |

Finance Committee

| |
|----------------------|
| W. L. Batt, Chairman |
| A. J. Brosseau |

H. A. Coffin
C. B. Whittelsey

Research Committee

| |
|---------------------------|
| H. C. Dickinson, Chairman |
| B. B. Bachman |
| B. J. Lemon |
| O. C. Berry |
| C. M. Manly |
| H. M. Crane |
| T. J. Little, Jr. |
| H. L. Horning |
| Thomas Midgley, Jr. |
| H. A. Huebotter |

E. P. Warner

Research Subcommittees

| |
|---|
| A. Highways (Cooperating with Rubber Association and Bureau of Public Roads.) |
| B. B. Bachman, Chairman |

| | |
|-----------------|-------------|
| H. C. Dickinson | R. W. Brown |
| C. M. Manly | B. J. Lemon |
| W. E. Lay | S. H. Woods |

J. F. Winchester

| |
|--|
| B. Headlights (Cooperating with Illuminating Engineering Society.) |
| H. M. Crane |

| | |
|-----------------|-------------------|
| C. E. Godley | J. H. Hunt |
| H. C. Dickinson | R. N. Falge |
| | T. J. Little, Jr. |

| |
|---|
| C. Fuels, Division 1—Economic Aspects (Cooperating with the A. P. I. and N. A. C. C.) |
| B. B. Bachman |

| | |
|-------------|----------------|
| H. M. Crane | R. P. Anderson |
| | H. R. Cobleigh |

O. C. Berry

| |
|--|
| Division 2—Specifications (Cooperating with the A. S. T. M. and B. of Stds.) |
| H. L. Horning, Chairman |

| | |
|---------------|-----------------|
| O. C. Berry | H. C. Dickinson |
| N. F. LeJeune | H. C. Mougey |
| H. M. Crane | C. F. Kettering |
| F. C. Mock | S. W. Sparrow |

R. E. Wilson

D. Riding Qualities.

| |
|---------------------------|
| H. C. Dickinson, Chairman |
| R. W. Brown |
| C. M. Manly |

T. J. Little, Jr.

E. P. Warner

| |
|---|
| E. Lubricants (Cooperating with A. P. I. and N. A. C. C.) |
| H. C. Dickinson |

| | |
|---------------|--------------|
| S. W. Sparrow | H. C. Mougey |
| | R. E. Wilson |



The headlighting symposium was one of the most interesting events of the meeting. Here are some of the speakers who contributed to the discussion: Top, left to right: R. E. Carlson, E. C. Crittenden and W. D'A. Ryan. Below: L. C. Porter (left) and William L. Dill

HEADLIGHTING—State Official Puts Blame for Faulty Lights on Car Builders

Says adjustment is neglected at factories. Instruction books criticized. Papers by L. C. Porter, G. F. Prideaux.

By Leslie S. Gillette

If ever the engineers of the automotive industry were made to sit up and take notice by the remarks of a layman, it was during the Headlight Session when T. J. Little, Jr., chairman of the session, called on William L. Dill, motor vehicle commissioner for the State of New Jersey, to comment on the headlight problem. Mr. Dill's criticisms of the part automobile manufacturers might but do not play in combating the headlight glare menace were so forceful that it was recommended by one of the speakers that a copy of these suggestions be sent to the general manager of each car factory for immediate consideration.

Perhaps the most startling of Mr. Dill's statements was that employees of the New Jersey automobile bureau, on checking the new cars sent out for road test as they left the assembly plant of a large manufacturer, discovered that 88 per cent of the cars did not have their headlights properly adjusted. In addition to this, Mr. Dill said that several manufacturers in attempts to reduce the cost of

these cars to a minimum have been purchasing inferior headlight equipment. Another source of annoyance, Mr. Dill said, is cheap replacements for the lighting systems which he illustrated by the fact that he had purchased headlights for \$1.98 and lenses for 15 and 20 cents.

Weight was given to Mr. Dill's statements by the fact that other speakers talked somewhat along the same lines. R. E. Carlson discussed the lighting conditions in the District of Columbia. In tests conducted by the Bureau of Standards on some 400 automobiles in Washington it was found that 73 per cent of the lights were out of focus. Results of the Bureau tests differed with those of the Dill, however, in that in the case of brand new cars a large proportion were satisfactory.

In reply to letters on the subject of headlight adjustment addressed to 51 automobile manufacturers, 34 replies were received. Quite a large number replied that adjustments were made at the factory while several, however, leave this matter to the dealers and distributors. In the

cases of several companies the information given in instruction books on the proper method of lamp adjustment was inaccurate.

Regulations recently formulated in Washington, D. C., require all automotive vehicles to be equipped with two headlights capable of showing a child in the darkness 200 feet ahead of the car. Beams must be focused so that they do not rise above 42 in. from the road at 75 feet distance from the car. It was shown that within 21 months preceding the new regulations, a large proportion of all accidents with automotive vehicles occurred at night, while 10 months after passing the law the figure had been reduced materially, a positive proof of the benefit of the system, Carlson added.

Taxicab Accidents Reduced

Another interesting phase in this direction was that several taxicab companies used to employ only marker lights and that the law compelled them to spend several thousand dollars in equipping the cabs with proper headlights. With proper headlights, one company reduced the total number of accidents occurring with its cabs from one a night to one a month.

Henry M. Crane pointed out that there are two factors to be considered in dealing with headlights. One is the safety aspect and the other the comfort angle. The uppermost thought, however, Mr. Crane said, must be the one that deals with the safety element. In his experience, the general complaints he hears about automobiles from the public are the effects of blinding headlights. In his opinion the public is willing to pay more if they can be given a satisfactory driving light. A Steering Committee operating jointly under the S. A. E. and the Illuminating Engineering Society is now handling a subject on "What is good light distribution?" and Mr. Crane believes as soon as this is determined other engineers will complete the mechanical end.

Another speaker from the Bureau of Standards, E. C. Crittenden, spoke at length on the physical angle, dealing largely with the functioning of the eye and pupil in regards to the light from headlights. Much of the trouble experienced with the eyes when another car having powerful headlights is approaching is that the driver of the other car tends to look at the approaching light. His remedy is for the driver not to look at the oncoming light but to endeavor to look clear down the road straight ahead. Present methods of street lighting are not suitable, he said, and could be considerably improved.

Exhaustive Tests Carried Out

Another speaker showed a Studebaker test car which was equipped with four headlights mounted on the fender cross bar. These lamps can be adjusted separately or beams can be build up as required. Various forms of shields have been tried and the lamps tested over several kinds of roads in various climates. This is because lamp specifications must be so that they are universal under most all conditions. For this reason, the lights have been tested on various road surfaces in fine weather, rain, snow and fog.

Mr. Crane stated the trouble has partially increased itself through the lowering of the driver in the seated position. The rear spring actions also have a lot to do with the irritating effect of certain beams. Mr. Crane said that very often when a lamp door is removed and a burnt out bulb replaced the focus and point of the light is thrown out. He urged that the lamp and bulb holder manufacturers make fittings much stronger so that replacements

of this nature will not throw the light beams out of focus. In fourteen instruction books, several of which were put out by leading car manufacturers, there was no inference, Mr. Crane stated, that the bulb should be refocused after a bulb has been replaced.

More than 400 members attended the meeting in which were presented two papers, one by L. C. Porter and G. F. Prideaux of the Edison Lamp Works, General Electric Co., entitled "What Happens When a Headlight is Out Of Focus" and the other by W. D'A. Ryan, General Electric Co., on "Light Characteristics of Automobile Headlights With Special Reference to Improved Distribution."

Mr. Porter said in part:

"As headlighting literature presents too technical a picture of what happens when the light source of an automobile headlamp is out of focus, an extensive study of the subject in an endeavor to clarify the technicalities was presented in the forms of photographs and simple charts, the object being to obtain data that emphasizes the necessity of accurate control of the size and location of the light source with respect to the focal point of parabolic headlight-reflectors. A great difference in the resultant beam of light is produced by a very small displacement of the light source, either through poorly constructed lamps or due to lack of proper adjustment, and the tests made evaluate how small these displacements and how great these differences are.

"Several difficulties of locating the light source or filament of the 21-cp. headlight-bulb at the exact focal point of the reflector were taken into consideration. These were: The practice of certain manufacturers who measure tolerances in sixty-fourths of an inch; of trouble due to wobbly sockets; distorted reflectors and the like.

Special Device Constructed

"A device constructed by L. C. Porter and G. F. Prideaux enabled the lamp socket to be moved in any direction by means of micrometer screws having 32 threads per in., thus causing a one-half revolution of the screws to move the light source exactly 1/64 in., backlash being compensated by spring. A test reflector made as perfectly as possible was used in connection with the device. Variations due to filament size, shape or relative position in the bulb were eliminated so far as possible by selecting lamps exactly correct as to light-center length, axial-alignment and bulb image. The same lamp was used for all the light-center length and axial-alignment tests, these being made by moving the one lamp with the aforesaid accurate focusing-device. Three types of lamps were chosen to give beams of wide, medium and narrow spread. With this equipment, the following effects and records were made by means of photographs, as well as by photometric and linear measurements:

- (1) Headlight beams, of variations in light-center length in the lamp bulbs or by improper location in the reflector.
- (2) Headlight beams, of variations in axial-alignment in the lamp bulbs or by improper location in the reflector.
- (3) Headlight beams, of a combination of variation in light-center length and axial-alignment of the headlight bulbs or their location in the reflector.
- (4) A spotlight beam, of variation in filament position in a headlight-bulb or location in the reflector, and headlight beams, of mandrel size or coil diameter of headlight filaments.
- (5) Spotlight beams, of mandrel size, and spotlight beams, of auxiliary-bulb image.

"The tests brought out clearly the need for accurately

made lamps and equipment and for accurate focusing if the headlight situation is ever to be brought under control.

"In summarizing the tests, it was shown the flux of light from an automobile headlamp to be analagous to the possibilities of distribution of one gal. of water. The light can be concentrated into a narrow powerful beam, which corresponds to putting the water into a deep vessel of small diameter, or it can be spread out as if the water were poured into a large shallow pan. When light is taken from one point, it appears somewhere else. The area that the light is to illuminate and the intensity of light on that area are controllable as are the depth of water and the area it will cover. The control of the light depends upon accurately made equipment having light source, reflector and lens held rigidly in exactly the correct relation with one another.

"Tests also indicate that limits of + or — 2 mm. in position of lamp filament with respect to the focal point of the reflector must be maintained to secure good all round illumination. This is the problem not only of the manufacturers of lamp bulbs in producing filaments located more accurately with respect to the lamp bases but also the problem of the manufacturers of brass lamps in producing sockets, focusing devices and reflectors that will 'stay put' within + or — of 2 mm."

Mr. Ryan said in part:

"Early automobile headlights were designed to give the maximum illumination ahead without reference to the oncoming driver. Certain laws have been enacted, based on

specifications prepared by the Illuminating Engineering Society, which acted as a first line of elimination of dangerous lamps. Specifications are about as good today as can be prescribed to regulate the existing headlights, but they are not ideal and, with the improvement in headlights, certain modifications will naturally be required in these specifications.

Glare Can't Be Avoided

"It is believed that it is physically impossible to have long range for driving and no glare at the same time with any headlight having a reflector of the parabolic type or any other reflector with the same vertical characteristics.

"Importance is stressed of giving good side light, not only to assist passing other cars or to judge road conditions or ditches at the side, but the further necessity of illumination turned at right angles to the main beam. In this manner road signs can be clearly read without the use of spotlights or other auxiliary units."

Mechanical features of the headlights and also the necessity of radical improvements, including the advantages of a unit which does not require focusing or constant attention in order to keep it in proper adjustment, were mentioned.

The two filament lamp, in the opinion of Ryan, is the best remedy for existing faulty headlights. Having in mind that the ultimate headlight will not only give range without glare, it should not require manipulation of any kind and will be set once and for all, for both city and country driving.

FUELS and LUBRICATION—Dilution of Oil Before Use in Engine is Advocated

Treatment of high viscosity oil with heavy ends of gasoline said to eliminate excessive crankcase dilution.

THREE outstanding features were developed at the Fuel and Lubrication Session. From the immediate standpoint of car operation, Dr. R. E. Wilson's disclosure of the commercial proximity of a new type of non-diluting engine oil was of the greatest interest. Also of much interest in a slightly different field was the form of volatility test for gasoline proposed by Dr. W. S. James. This method gets away from the present batch method of determining the distillation curve of the fuel and approaches the common ground between the refiner's manufacturing conditions and the conditions which obtain in the intake manifold of the engine.

Better Fuels Anticipated

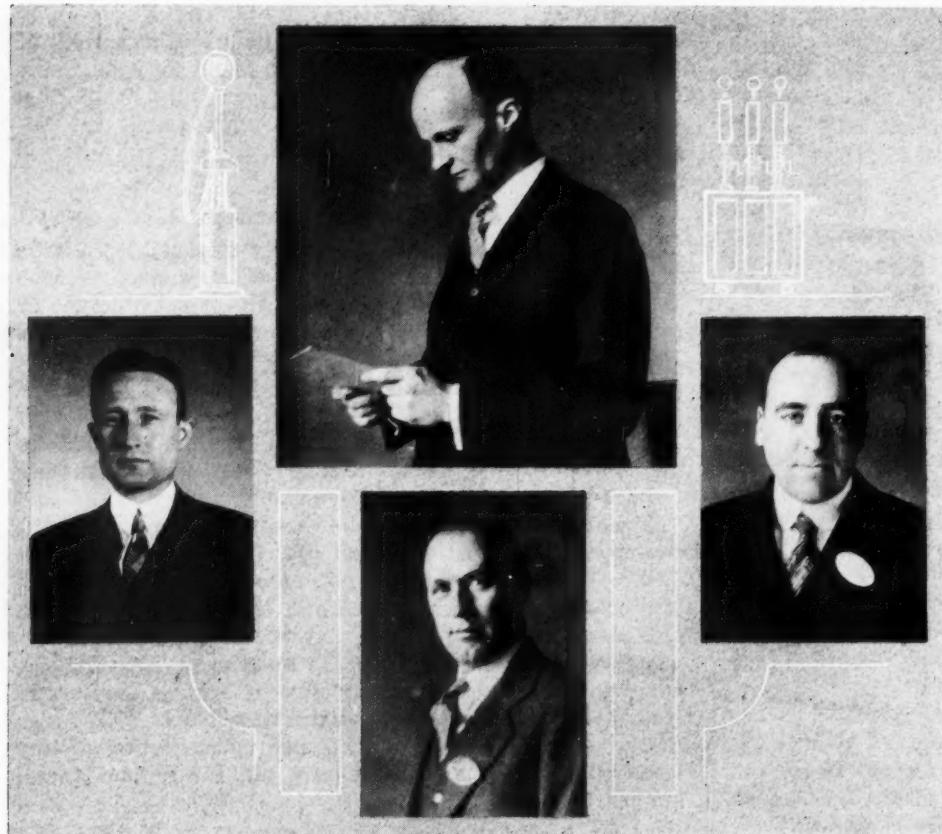
From an entirely different angle was the statement of Dr. J. B. Hill that refiners anticipate the ultimate development of blended fuels which will operate under compression pressures of 150 lb. per sq. in. without detonation. While this fuel is not imminent commercially, the detonation point of fuels is rising gradually and laboratory work points in the direction of the high figure mentioned. Both Dr. Hill and Dr. James feel that volatility of gasoline is the important factor, particularly for starting, and while present fuels are more volatile than those of the immediate past, the most desirable condition

has not been obtained. Dr. James' new continuous distillation routine is a step in this direction.

The water and dilution problems were handed over to automotive engineers by all of these men in the sense that water precipitation with its adverse effects can only be eliminated by higher engine operating temperatures. Dilution in excess of the normal amount also is related to the same factor and that of general mechanical make-up of the engine. Normal dilution ranging from 7 to 15 per cent is regarded as advantageous rather than the reverse, and these figures can be maintained if automotive engineers will secure higher operating temperatures, the elimination of dirt in air and oil and lasting conditions of mechanical excellence at the pistons and cylinders.

An added feature of the meeting was Thomas Midgley's statement that ethyl gas and tetra-ethyllead had received a clean bill of health from the surgeon general and were to be subjected only to the general rules of safety which apply to the manufacturing and handling of many chemicals used in commerce. This action follows the voluntary withdrawal of this fuel following some newspaper agitation.

Although this was the final session of the midwinter meeting and another session was running concurrently,



ABOVE: W. S. James, who proposed a continuous method of distillation of gasoline in his paper at the Fuels and Lubrication Session

LEFT: J. B. Hill said that refiners anticipate the development of blended fuels which will operate under compression pressures of 150 lb. per sq. in. without detonation

BETWEEN: R. E. Wilkin, co-author of the paper on a suggested remedy for crankcase dilution, which was read by R. E. Wilson

RIGHT: R. E. Wilson, who presented the idea of using dilution to combat dilution of crankcase oils

the attendance figure was in the neighborhood of 300. The chairman was Henry M. Crane. "Detonation and the Petroleum Industry" was the subject of the paper by Drs. T. G. Delbridge and Hill, of the Atlantic Refining Co., the presentation being made by the latter. Influences such as those of high compression aviation engines, the European tax and the desire to conserve the fuel supply were reviewed. All of these point to the need for higher compression ratios and their more efficient operation. Non-detonating fuel is somewhat of a misnomer as fuels detonate at some pressure, although that of benzol is above 400 lbs. With the increase of boiling point, the tendency toward detonation tends to increase. California and Gulf Coast fuels are superior to Pennsylvania and straight paraffine oils in this respect. In fact, the first fuels are the equivalent of a blend of the latter with 10 per cent benzol.

Plenty of Fuel in Coal

The cracked fuels combine volatility with the relative diminution of detonation. While no shortage of petroleum exists at present and is not to be expected in the near future, this supply as related to automotive fuels can be augmented when necessary by the low temperature carbonization of bituminous coal. Based upon the amount mined annually, this process is capable of producing 1,250,000,000 gal. per year of a fuel with pronounced benzol content. The later use of the coal in the usual way is not affected.

Continuous distillation of gasoline as against the present batch method was advocated by Dr. James as the form of test which will conform to manufacturing methods and approach the conditions which occur in intake manifolds. In the present methods each fraction is boiled off separately or in stages, therefore many of them are not in contact with the lower fractions. This condition changes the observed characteristics of the fuel in a way which does not conform with the manufacturing

process or its use in the engine, while it is stated that the new continuous method in its full development will meet both conditions, particularly when manifold depressions and correct proportions of air can be introduced. Dr. James had a sample laboratory apparatus at the meeting and demonstrated its use following the close of the session. His paper was entitled "Gasoline and New Fuel Tests."

Dr. Wilson presented the novel idea of combating dilution by dilution to produce an altogether advantageous result. His talk was based on laboratory research and road tests over a rather long period. Experiment has demonstrated that dilution, if not promoted by some extraneous cause, reaches a normal equilibrium of about 7 per cent in summer operation and 15 per cent in winter operation. The source of dilution is the combustion space, but an opposite action depending upon the heat of the engine, ventilation, etc., tends to reduce dilution in the crankcase. Ultimately these two tend to balance.

Present oils, if undiluted, make winter starting almost impossible. This statement pertains particularly to the medium oils commonly used. But as dilution occurs, the viscosity of this oil falls below that of good lubrication and the viscosity of light oil drops to a most dangerous point.

His proposition, which has been confirmed by service work, is to use an oil of higher initial viscosity mixed with a fraction of the heavy ends of gasoline. One oil of this type had an initial viscosity of 525 before mixture with about 11 per cent of diluent, which brings the final viscosity down to the neighborhood of 215, an excellent figure for engine lubrication and starting.

After being placed in the engine, the diluent works out in about 180 miles, and the diluent action of the cylinder occurs and balance is finally struck in the region of 15 per cent, but the viscosity of the lubricant remains in the belt of good lubrication at about 200. Dr. Wilson's tests have shown that 90 per cent of dilution occurs in

the first 180 miles of operation after new oil has been put in the crankcase. In reply to questions, he stated that the new oil is patented, will cost only a little, if any more than present medium oils, and will be placed on the market, according to his statement, in a matter of a few years, or more significantly, a few months.

Dr. Wilson was particularly emphatic in his distinction of the work before automotive and lubrication engineers. In this statement he had the support of H. C. Mougey of the General Motors research staff. Both insisted that the elimination of water and dirt is squarely up to the engine designer. The means of solution of this problem are immediately available and the question cannot be begged. If these two elements are eliminated from crankcases, the lubrication problem will vanish into thin air.

"Non-Diluting" Oil

—R. E. Wilkin, R. E. Wilson

AFTER extensive tests, Robert E. Wilkin and Robert E. Wilson, both of the Standard Oil Co. of Indiana, determined that the oil of the average car in winter service in the northern half of the country is diluted during the first 150-180 miles so that its viscosity is about one-third of its original value and that beyond this the viscosity remains fairly constant, at an equilibrium value corresponding to about 15 per cent dilution.

As a remedy they suggest the use of a fairly heavy oil (500-575 sec. at 100 deg. F.) blended with 10-12 per cent of a distillate having a boiling range substantially identical with that found in the average crankcase oil at equilibrium.

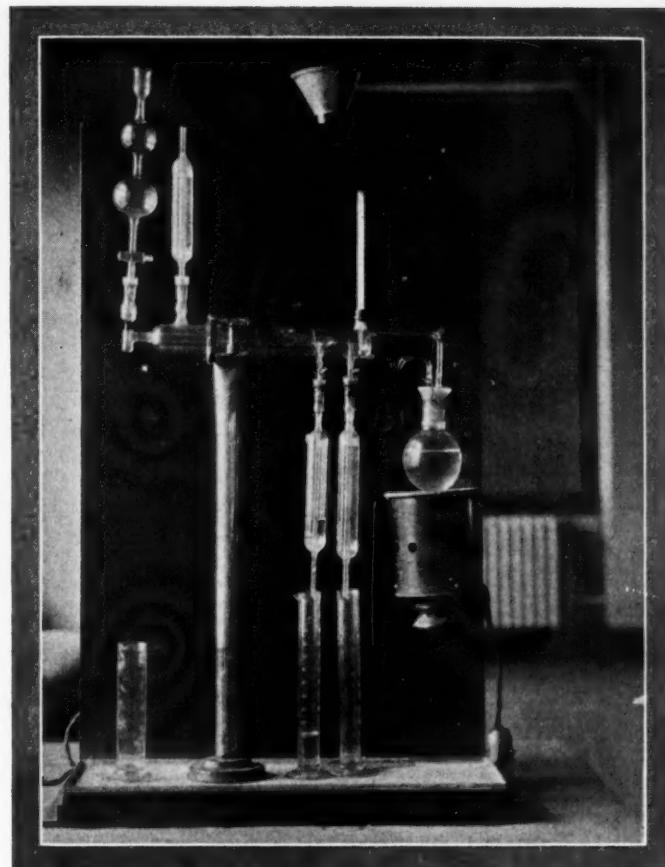
These theoretical considerations have been fully confirmed by a series of tests in two fleets of cars and trucks operating in both winter and summer on the old and new types of oils. The paper, which follows in part, gives an exposition of the theories behind the suggestion as well as descriptions of the operation and results of the tests which proved the practicability of the theories:

It appears to be well recognized that the two factors of most importance in producing dilution are cold starting with a choke, which introduces considerable liquid gasoline into the cylinders and thence to the crankcase, and excessively cold cooling water, which causes the heavy ends of gasoline to condense in the cold oil film on the cylinder walls and wash down into the crankcase. Air temperature, the use of hot spot manifold, and the "blow-by" of vapors past loose rings seem to be much less important than has frequently been assumed.

Factors Which Eliminate Diluent

Acting in the opposite direction are certain factors tending to eliminate this diluent from the oil. Again the cooling water temperature is important, for whenever it heats up to a proper operating temperature—say 160 deg. F.—diluent is eliminated fairly rapidly from the film on the cylinder walls, which is constantly being replaced by fresh oil from the crankcase. The crankcase oil temperature is also important, especially if there is much "breathing" of air into and out of a crankcase, as in the case of four-cylinder cars. Any "blow-by" of hot exhaust gases would undoubtedly help to eliminate dilution by this route, especially if the crankcase oil were warm.

The very unsatisfactory nature of the present situation in automobile lubrication from both an engineering and a



Apparatus for continuous distillation test of gasoline exhibited by W. S. James in connection with his paper, "Gasoline and New Fuel Tests," at the Fuels and Lubrication Session

practical standpoint is best illustrated by what happens in the case of the oil in the average car in winter service in the northern half of the country. This average car starts with fresh medium oil whose viscosity (at 100 deg. F.) is about 325 sec. Saybolt. Regardless of the pour test of the oil, this viscosity is undoubtedly too high for easy starting in a cold garage, or for proper circulation in the average oil pumping system until the engine has warmed up. After running about 180 miles, however, the oil in this average car has diluted about 15 per cent (winter conditions) and its viscosity has dropped to about one-third of its original value.

It must be admitted that viscosities around 115 sec. represent a very small factor of safety above a real danger point, and that cars which dilute somewhat more than the average, or which happen to accumulate an excessive amount of dirt before the oil is changed are very likely to acquire scored cylinder walls or badly worn bearings, and bring discredit on both the automobile manufacturer and the oil refiner. Thus an oil of 325 initial viscosity when diluted 20 per cent, as happens in many cars, has a viscosity of only about 87 sec., about one-fourth of its initial viscosity, and is certainly in an unsafe region.

It is thus seen that the average present-day car is using an oil which is at best a compromise, being too viscous at the start for satisfactory winter lubrication, and too thin after about 200 miles. While it may shatter some illusions, which have been more or less fostered by both the oil and the automotive industries, it is nevertheless true that the specification of oil viscosities for given cars is not an exact science, but represents an unsatisfactory compromise between the demands for easy starting and good cold lubrication with fresh oil on the one hand, and

fairly good viscosity after 15 or 20 per cent dilution on the other. When lubrication troubles do occur it is hard to tell whether they are due to too heavy or too light an oil, because the same general type of injury to a given engine from a given grade of oil may result either from no lubrication for 5 or 10 minutes after starting with the cold fresh oil, or from operating a hot engine with the same oil excessively thinned out by dilution.

In should be noted in this connection that the real reason for recommending changing of the oil after 500 miles is not that the viscosity or dilution is changing much at this time, but that dirt is accumulating to a dangerous extent if the oil is of low viscosity.

In selecting a satisfactory non-diluting oil the first requirement, to insure easy starting in winter and good,

cold lubrication, is that the initial viscosity should not be more than about 240 at 100 deg. F. The lower limit for initial viscosity was set at 190 sec. The other limits which determine selection are based on its condition after it has been in use in different kinds of service. It was considered that the oil used should have a minimum viscosity of 105 sec. when diluted 20 per cent, while with 5 per cent dilution maximum permissible viscosity was set at 360 sec. An oil which fulfills these two sets of conditions then is the preferred type.

In actual practice the use of relatively low viscosity non-diluting oils has given excellent results. In six cars which used such an oil all last winter no starting troubles were experienced and no lubricating troubles. Summer results were just as good.

SUPERCHARGERS—Needed Most for Low Speed Operation, Says Duesenberg

Builder of racing machines thinks improvements in other directions will take care of all high-speed demands.

By W. L. Carver

THAT interest in the supercharger goes well beyond the racing idea was demonstrated by an attendance of about four hundred members at this session of the annual meeting.

Perhaps the outstanding feature of the session was



Many took advantage of the opportunity to inspect the Roots type aircraft supercharger which was shown at the Supercharger Session

the comment of Fred Duesenberg, who in addition to being head of the motor car company bearing his name has been consistently successful in the building and racing of supercharged engines, that he does not feel that the real purpose of the supercharger is to brace up volumetric at high speeds and loads. Rather, he advocates an electrically driven supercharger or agitator which will run at constant speed regardless of engine speed. Such a unit would have greatest effect at low speeds and then chiefly in the direction of better atomization and distribution of the fuel.

In Mr. Duesenberg's opinion, improvement of the valve gear and manifolding will take care of all the demands of high speed operation.

Papers were presented by C. R. Short and C. W. Iseler of the General Motors Corp. The first, "Supercharging Internal Combustion Engines," constituted a review of the history of the supercharger, demonstrating that the idea is neither new nor freakish. In the second, the performance of the supercharged Mercedes engine was examined and analyzed.

A feature of great interest was the illustrated talk of Dr. S. A. Moss of the General Electric Co., who is well-known for his association with the work of supercharging aviation engines. Participants in the discussion were H. A. Huebotter, M. G. Chandler, C. F. Taylor and C. W. Smith. The chairman of the session was W. R. Strickland of the Cadillac Motor Car Co. A Roots blower type supercharger designed for aviation service was exhibited at the end of the session.

The manner in which an engine with manifolds, valve size and timing adapted to low speed operation is converted into an engine of great power, efficiency and flexibility was discussed by Mr. Iseler in his paper, "Practical Application of Superchargers to Automobile Engines." His example was the Mercedes six-cylinder engine having a bore of approximately 3.15 in. and a stroke of 5.118 in., the displacement being 239 cu. in., and normal compression ratio of 5.4 to 1. The latter figure is above that of



Photos by Lazernick

Those who attended the Supercharger Session heard much of interest from these men. Left to right: C. R. Short, C. W. Iseler, Dr. Sanford A. Moss and Fred S. Duesenberg

allowable American practice but does not produce detonation with the German blended benzol and gasoline fuel. Without the supercharger this car has a maximum speed of 50-60 m.p.h. With the supercharger this figure is increased to around 90 m.p.h.

Supercharging is introduced at moderate speeds, say 30 m.p.h. Below this point the engine is a very efficient slow speed unit, but as supercharging overcomes the drawbacks of small manifolds and valves, the power curve goes up to a peak of approximately 100 hp. at 3000 r.p.m. On this engine a Roots blower type supercharger is driven through a clutch and gear train from the front end of the crankshaft, being engaged by travel of the accelerator pedal beyond normal full throttle opening.

About 10 hp. are required for driving the supercharger at 3000 r.p.m. The gain in power is about 54 per cent above that of a normal high speed engine of the same displacement. Due to the supercharging action, volumetric efficiency is practically 100 per cent at high speeds and the compression ratio is 7.3 to 1. In practically every phase of operation, this engine shows advantages over the conventional type. Light weight, high fuel economy, flexibility, high power per unit of displacement are a few of the advantages demonstrated by Mr. Iseler's talk.

Dr. Moss talked informally from the standpoint of his long experience with superchargers, first pointing out the weight and altitude advantages following the use of supercharged airplane engines. As applied to blower design generally, he emphasized the need for the most careful mathematical study of the diffuser portion which is located around the periphery of the propeller. Proper design will bring about a reduction in velocity with a rise in pressure. An interesting sidelight was presented by lantern slides of some of Lieutenant Macready's flights with supercharged engines and Major Schroeder's famous five-mile fall when the altitude record was established. These showed that insofar as the internal operation of the engine was concerned, conditions of practically atmospheric pressures prevailed at all altitudes.

He confirmed one of Mr. Short's statements concerning the trend in Diesel engine practice and his slides illus-

trated most graphically the advantages of the electrically driven blower for scavenging and supercharging. In closing, Dr. Moss showed a theoretical curve indicating that supercharging at a pressure of 4 lb. should produce an increase of 55 per cent in power.

Mr. Duesenberg differed from Dr. Moss as to the applicability of large diffuser chambers due to the explosive effect of the large residual volume of gas. In his racing practice, he has held the volume of the diffuser and volute chamber to the smallest practical limits. In answer to an objection by Mr. Taylor, he stated that the noise is less than that of most carburetors. The location of the supercharger at the outlet side of the carburetor also has his support due to the elimination of the pressures at the float chamber.

The Art of Supercharging

—C. R. Short

THE object of supercharging is to force into the cylinder during each cycle a greater amount of charge than can be drawn in by the pumping action of the cylinder and piston, in the time available. Four types of pump have been used, viz., piston and vane pumps, the Roots blower and the turbo compressor. Piston pumps are out of the question where the total weight has to be kept low.

Supercharging may be effected by forced induction, supplemented induction, scavenging and two-stroke operation. In the forced induction engine the whole of the charge is supplied to the cylinder at a pressure higher than atmospheric, by means of a special pump, and sometimes a receiver is interposed between the pump and cylinder. In order to reduce the pumping work and the size of the pump, most of the charge may be drawn in by the engine in the normal way, and this pumping action supplemented by a special pump. The chief objection to this plan is the complication of the necessary valves and their timing.

By employing a pump to compress air to a pressure slightly above atmospheric, all of the residual gas in the combustion chamber may be swept out at the end of the

exhaust stroke. A greater amount of charge can then be drawn into the cylinder by the normal pumping action of the engine, particularly since the cylinder walls are cooled by the scavenging air. This is said to also permit of a higher compression ratio being used.

In a two-stroke engine a charge pump is required in any case, and supercharging can be effected in a simple manner by enlarging the capacity of this charge pump. One objection to this method of operation is that a considerable proportion of the fuel charge would escape or be forced out of the exhaust port. One designer, recognizing the waste of fuel during the scavenging process, does his scavenging by means of air compressed in the crankcase and employs a separate pump to force in combustible charge.

The Root's blower type of pump has been used successfully for supercharging purposes on racing engines by Mercedes and also by Vauxhall, Talbot, Sunbeam and Alfa-Romeo. A modified Root's blower using triple blades, known as the Berk supercharger, is manufactured by Thwaite Brothers, England, and has been used on AC, Austin Seven, Alvin, Aston-Martin and other cars.

The turbo compressor and exhaust turbine in which the exhaust gas of the engine drives an exhaust turbine and the latter drives a turbo compressor, has been developed by Rateau in France and Dr. Moss in this country. Dr. Moss' work was done at McCook Field, Dayton.

At the present time the most successful type of blower developed for racing cars is the turbo compressor as used by Duesenberg and Miller. It is a modification of the airplane compressors of Prof. Rateau, Dr. Moss and Schwade.

Regarding the possible use of superchargers on passenger cars, Mr. Short said the requirements in this service are greatly different from those in airplane, Diesel and racing engines, in connection with which superchargers are being successfully used at the present time. Mere increase of intake manifold pressure will result only in increase of power at maximum speed. If it were possible to also increase the torque at low speed the supercharger not only would add to the power obtainable from an engine of given displacement, but would also increase the flexibility of the engine. The engine could be reduced in size and the supercharger supply the reserve power needed on grades, which might make it possible to simplify the transmission.

AERONAUTIC—Experts Argue Merits of All-Metal and Fabric Type Dirigibles

Several points in Upson's paper on metalclad airships disputed by Dr. Arnstein. H. F. Parker compares dirigible and plane.

JUST as discussions have taken place in the past as to the relative advantages of metal and wood construction for automobiles, airplanes and other mediums of transportation, the main topic at the Aeronautic Session centered around a comparison of certain features of an all-metal dirigible with known advantages of the fabric and metal construction of airships of the Zeppelin type.

Following a paper entitled "Metalclad Rigid Airship

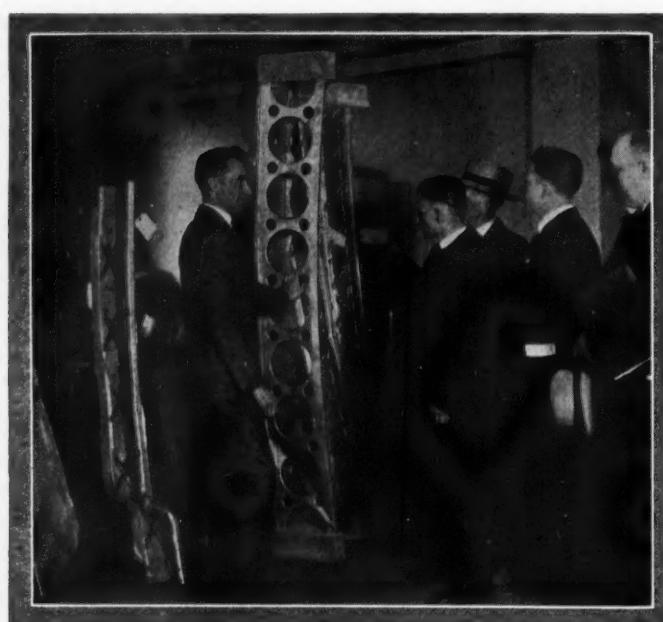
Development" presented by Ralph H. Upson of the Aircraft Development Corp., sponsor of the all-metal airship, in which details of the construction of the metalclad airships were made public for the first time, Dr. Carl Arnstein, Zeppelin designer, took exception to several important advantages claimed by Mr. Upson for the all-metal type of airship.

Dr. Arnstein, who is vice-president of the Goodyear-Zeppelin Co. of Akron, Ohio, and designer of over 90 of the 115 Zeppelins constructed in Germany, complimented Mr. Upson, however, on the originality and untiring efforts that had been put into the development of the metalclad airship. He also expressed the hope that in future developments of the metal type of ship the 25 years' experience of building Zeppelins would not be abandoned.

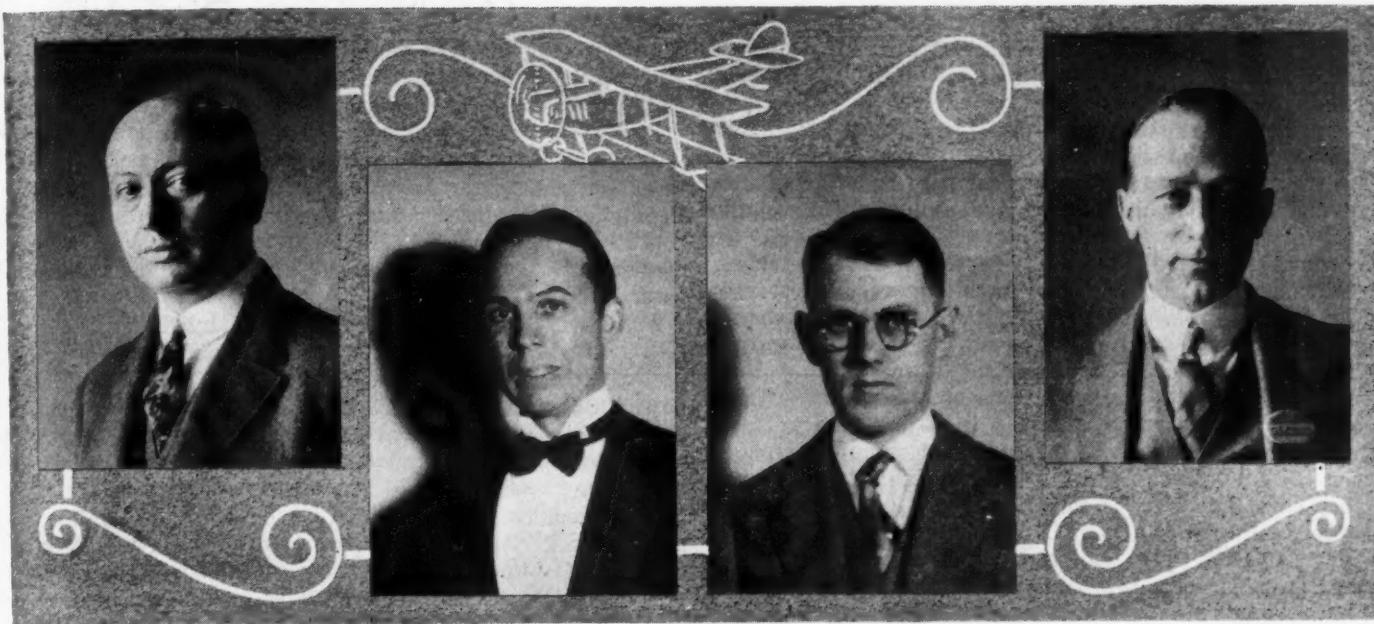
The technical discussion about the two distinct types of airships could be easily followed by the less initiated on account of an interesting paper delivered earlier in the session by H. F. Parker entitled "The Economic Spheres of Usefulness of Airship and Airplane." Mr. Parker brought to light several new phases in his comparison of the airship with the airplane. The airplane is more limited to the extent of the gross lift possible than the dirigible, he said, pointing out that with a plane of 100 tons gross lift (which is about the size limit of a plane), over 90 per cent of the total weight is deadweight. Whereas, in the case of the airship of 5000 tons gross lift less than 80 per cent is deadweight.

Mr. Parker showed by charts that with the increase in size of aircraft there is a greater increase in deadweight.

In mentioning the known principle that airships must be used over long distances with the airplane on shorter lines, Mr. Parker predicted an increase in the number of small airplanes rather than an increase in size. This will enable greater speed to be made between two points and will reduce the time between departure schedules. To



An interesting exhibit in connection with the Aeronautic Session was that of the metal supports developed for the metalclad airship described in the paper of Ralph H. Upson



Photos by Lazarnick

Men who were prominent in the discussion of aeronautic subjects. Left to right: Dr. Carl Arnstein; Grover C. Loening, whose paper on amphibian airplanes was read at the General Session; Arthur Nutt, chairman of the Aeronautic Session, and H. F. Parker

compete with railroads, aircraft must be able to maintain a constant speed of 90 to 100 m. p. h. Present airships average about 50 m. p. h. and this figure should be raised to 75 for economical operation.

There is much more comfort in airship travel Mr. Parker said, and night flying with passengers in airplanes is almost impossible as sleep is very difficult. Mooring masts will do much to popularize the use of airships and ships should return to the hangar only for repairs or inspection. Improvements must be made in airship radio communication so that the pilot can be warned of approaching storms.

Early in Mr. Upson's talk he made the remark that no commercial concern is willing to take the Los Angeles as a gift and put it into operation on a private air line for the carrying of passengers and goods. This condition exists, he believes, for several reasons: (a) first initial cost, (b) difficulty of mooring and lack of sufficient masts, (c) depreciation, (d) high cost and limited quantity of Helium and (e) the difficulty of manoeuvering.

In describing the construction of the metalclad airship principle, Mr. Upson touched on practically all phases which are covered in the digest of his paper which follows later. In the near future, construction probably will commence on the first metalclad airship known as the MC-2 which will have a 200,000 cu. ft. capacity—about one-tenth the volume of the Shenandoah.

Dr. Arnstein's criticisms, which touched on almost all phases of the metal construction, were later answered by Mr. Upson.

Chief among the objections raised by Dr. Arnstein against the metalclad ships were:

Failure of metal covering.

Doubts if metal seams will retain gas as well as goldbeaters skin.

Metal covering will melt by contact with flames.

Holes in metal covering dangerous to airship.

Metalclad unsafe in lightning storms.

Difficulty to repair metal covering.

Damaging effects from corrosion.

Wind resistance due to shape.

Airship not stable or controllable.

Objection to method of fin arrangements.

While answering Dr. Arnstein's comments, Mr. Upson read messages from authorities on the subject of lightning indicating that there would be no danger from lightning storms. One of the advantages claimed by Mr. Upson for the metal covering is that the outer surface will never require attention. Dr. Arnstein stated that several Zeppelins had used outer covers which were six or more years old without ill effects, to which Mr. Upson answered that a considerable portion of this time the Zeppelins must have been in a hangar.

Wind tunnel experiments with airships, Mr. Upson said, are not as accurate as those conducted upon airplanes and the only means of testing airships is to make practical demonstrations.

All-Metal Airship Design

—Ralph H. Upson

THE application of all-metal structures to aircraft is held to offer the following advantages over fabric-enveloped, lighter-than-air machines: More substantial, more efficient, fireproof, more economical, available for longer flights.

For several years the Aircraft Development Corporation, with which Mr. Upson is connected, has been experimenting with metalclad aircraft and has finally developed a design in which duralumin sheets form the gas envelope instead of the fabric used heretofore. Tests with models of this design have shown it to be superior in many ways to fabric airships.

The paper discusses the theoretical elements of design of a metalclad aircraft, the actual design of the MC-2—the new airship—and the conclusions regarding the future field of such craft as may be drawn from the results of the many tests to which the model has been subjected.

The general theory of the metalclad airship has been mathematically and experimentally proved. Metal construction proves to be superior in almost every respect, whether the ships are filled with non-inflammable helium, or with the buoyant and more useful hydrogen. The preliminary design of an express airship of 1,600,000 cu. ft. displacement, first undertaken, showed a greater load-

carrying efficiency, speed, and power efficiency than the somewhat larger Shenandoah. The cost to construct even the first unit of such size would be less than the cost of the Shenandoah.

From the weight statements that form a necessary part of the design of the tentative 1,600,000 cu. ft. ship, it has been determined that, contrary to common belief, all-metal construction makes possible an actual reduction in weight compared with fabric construction.

The load is carried first into a perfectly circular transverse frame and from there by pure shear stresses into the surface plating. The frame itself is held to shape by its own rigidity and an arrangement of load-carrying elements that reduce the stresses to a minimum. But suppose now that the surface plating between frames were unsupported and perfectly flexible in a direction normal to the surface. It might be inferred that the unsupported part of the surface would tend to distort like a "non-rigid." In this case, however, it may be shown mathematically that there is no tendency for it to distort from its original circular form for any but mere secondary forces. The latter are taken care of largely by the double curvature of the hull surface (*i.e.*, the absence of straight elements).

Hull Doesn't Need Pressure

It should be noted here that the pressure in the metalclad has nothing to do with maintaining the form of the hull as in a non-rigid. The metalclad hull retains its form invariable regardless of pressure, the latter having to do only with the stresses and local vibrations.

It used to be thought that an airship had to be long and slim to go through the air easily and have proper stability. For the metalclad ship, good structural efficiency requires a fairly short and compact hull. According to the best evidence available (U. S. Navy tunnel), our new hull form has a lower resistance for equal volume than any shape hitherto produced. This is for a length: diameter ratio of only 2.8 compared for example to 7.2 for the most recent Los Angeles and 8.6 for the Shenandoah.

The improvement in stability is even more striking. With our new fin arrangement totalling 17 percent less area than the Shenandoah surfaces (for equal volumes) the stability and control is more than twice as good, and studies now under way give promise of still better results.

No part of the ship shows a safety factor less than 3. All essential or critical parts are still stronger, as shown by some 600 detail stresses.

The hull of the ship is entirely of metal except for an

internal fabric diaphragm separating the "ballonet" or air compartment from the gas above. This diaphragm yields with varying proportions of gas and air in the same way as the bottom portion of the gas cells in a conventional "rigid." In the MC-2 however, the ballonet diaphragm will normally be kept flat down against the bottom of the hull, in effect making a metal container of the entire hull throughout the greater part of which the gas is in direct contact with the metal. This highly desirable arrangement naturally depends upon having a reasonably gas-tight surface.

Many different types of seams were tried without success. But it was apparent that if the same rivet spacing and other dimensions as used in gasometer practice could be reduced in proportion to the thickness of sheet, the results should be comparable. The big trouble was the enormous number of tiny rivets (about 3,000,000 in the small MC-2) which would be required. This problem has been solved by our successful development of a special riveting machine which automatically puts in upwards of 5,000 rivets per hour and does it much better than would be possible by hand. Tests have averaged less than one-tenth the leakage usually specified for goldbeater-skin fabric.

The material itself is a development of the duralumin manufacturers who have cooperated in a very fine way to render their product available in the form needed. The art of rolling thin duralumin sheet, in fine gauge, in great width, in long continuous length, unusually flat for the tempered condition, and with a close control of gauge, a work of the last three years, is peculiarly American, and beyond anything that has been done in Germany, England or France.

On account of its small volume (about equal to one of the gas cells in the Los Angeles), the MC-2 will have only a single gas compartment, and a single outside-hung car. Larger metalclad units will have compartments divided by partitions which will bulge in the direction of the pressure difference. They will also have most of the useful load carried in corridors, preferably one on each side, either internal or external. The construction also lends itself admirably to the use of engines housed within the hull.

With the MC-2 the gas (hydrogen or helium) will be put in under a slight pressure while the hull is in a vertical position. This is done by direct displacement of the air which is removed at the lower (stern) end, including the impure mixture at the surface of separation. Careful



Ralph H. Upson
had on display a
model of his
metalclad airship
which he described
in his paper at
the Aeronautic
Session



analysis shows that the latter, under proper conditions, need not exceed 10 per cent.

From a practical operating standpoint, the metalclad airship will be very easily controlled. Due to its combination of perfect rigidity and its ability at the same time to carry considerable internal pressure, it may be operated either like a conventional rigid without reference to pressure, or like a non-rigid airship by watching the pressure manometer, and regulating the altitude accordingly. The latter method will be usually preferable because in that way the hull can be kept full of gas and maximum advantage taken of its extremely good gas-holding properties.

We are recommending that hydrogen gas be used for inflation on account of its availability, cheapness, lifting qualities, and the fact that it can be used for reserve fuel, which will reduce the weight of water ballast recovery apparatus. If helium is desired, however, it can be used to better advantage than in a fabric airship because of the almost negligible leakage through the metal hull, and the higher gas purity which can be maintained. Even with helium, it is a great asset that the surface of the ship itself is fireproof.

Airships vs. Airplanes

—Humphrey F. Parker

A DETAILED comparison of the efficiencies of airships and airplanes show that with respect to range the large airship has a surprising superiority, not only at the usual speeds of 60 and 70 m.p.h., but even at 100 m.p.h., a speed which is not yet practical. It is also shown that the small airship has no advantage over the airplane in this respect.

The airship also is in the advantage in respect to fuel economy. It is shown in the paper that an airship of 150 tons traveling at 70 m.p.h. requires only one-quarter the fuel per ton-mile and at 105 m.p.h. only one-half the fuel needed to propel a ton of airplane a mile at the same speeds. The fuel consumption of the airplane is shown to be independent of the speed, while that of the airship increases rather rapidly with the speed, so that the comparison is more favorable to the airship the lower the speed. Airships of the size referred to (5 million cu. ft.) are under construction at present, so this great advantage would seem to be attainable.

In the past this great advantage in respect to fuel consumption has been partly negated by the waste due to the discharge of lifting gas in order to maintain the equilibrium as the fuel is consumed and the weight thereby reduced. Assuming 25 cents per gallon as the price of aviation gasoline, and \$5 per 1,000 cu. ft. as the cost of hydrogen, then for every \$100 spent on fuel it has been necessary to waste \$176 on hydrogen. Thus, even when wasting hydrogen, an airship of 150 tons can compete with a plane in fuel consumption on an equal basis at 70 m.p.h.

Fortunately this waste is no longer necessary, there being two methods now available for dealing with it. The first is water recovery, which has been developed in this country and which completely eliminates it, and the second hydrogen burning, developed in England, which puts the hydrogen to a useful purpose.

As the size of an airplane is increased, unfavorable factors come into play which render it less efficient than those of the size in use at present. In all aircraft the weight of the structure increases at a greater rate than the load the aircraft can lift. It is shown that the weight of an airplane wing varies as the cube of its length, while its carrying capacity varies only as the square of its length,

assuming geometrically similar wings, and it follows from this that if the increase in size is continued, ultimately a point will be reached where the wing is incapable of sustaining its own weight. Of course, instead of increasing the length of the wings, the number of wings might be increased, but the author does not believe that much is to be gained in that direction. The change from a monoplane to a biplane only just pays, and the change to a triplane is of advantage only in large sizes.

It is believed that the cubic law of weight increase with wing length begins to make itself felt in the design of wings in machines of a gross weight of 10,000 lb. However, it is customary to permit a lower factor of safety in machines larger than this, thus dodging the effects of the law, but finally the factor of safety reaches a minimum permissible limit; this is believed to be about one-half that usually allowed in planes of 10,000 lb. or less, and 10 tons has been assumed as the weight at which the law commences to operate.

Somewhat similar conditions exist in the case of the airship. There is a limit to the maximum size possible, but the law affecting it is different from that in the case of the airplane, and it is possible to go to sizes far in excess of anything contemplated at present. Actual improvement in efficiency may be expected with increase in size up to 300 tons at least.

In the case of the airship, the lifting power varies as L^3 , the weight of the main structure varies as L^4 , but the weight of the outer cover and of the gas cells varies only as L^2 . At first the saving on the weight of cover and gas bags more than balances the loss on structural weight, but ultimately the latter becomes the controlling factor and the total weight increases.

Though there is an upper limit for the airship, it is not likely to bother us for a long time to come; it is the lower limit that will make itself felt. It would appear that airships and airplanes of the same size are never likely to be in direct competition, the small size being held by the airplane and the large size field by the airship, with probably a gap in size between the two types.

After going into the subject of comfort in the two types of craft in detail, Mr. Parker summarizes the subject by saying the superiority of the airship in this respect is so great that where considerations of cost permit the running of airships, passengers will refuse to travel on competing planes except in emergencies.

Few data are available as to the relative costs of construction. However, in England, both types of craft seem to be on a common level in this respect, as the cost of both airplanes and airships is approximately \$10,000 per ton, and in the case of airships the same figure is arrived at from the price paid by the German Government to the Zeppelin Company for the ZR-3, namely \$750,000.

The Amphibian Airplane

—Grover C. Loening

NOTE: While Mr. Loening's paper was read at the General Session, Tuesday evening, it is strictly along aeronautic lines and for that reason is included here with the other papers and discussions on aeronautical subjects.—The Editor.

AS the result of exhaustive tests by the army and navy air services with numerous Loening amphibian planes in climates ranging from the tropics to the arctic circle, Grover C. Loening, president of the Loening Aeronautical Engineering Corp., manufacturers of the amphibians, stated that this type of plane offers the greatest advantages for future commercial air line work.

With machines of this type, Mr. Loening says, it is

possible to reach the airplane and be in the air in five minutes from the time of leaving the business center in New York, Detroit or Chicago by using the facilities offered by the water front adjoining these cities. This method of taking-off and landing is not restricted to these cities but to numerous large towns all over the country. By taking advantage of lakes and dams it is possible to land in the midst of the Rocky Mountains where there are few landing fields for the "wheeled" type of plane.

As it is not necessary to travel by automobile for approximately an hour to reach the flying fields from the center of our large cities, as is most often the case, and on account of more direct flying being possible through taking greater advantages of natural landing places in the form of open water, there is a saving in time over long distances of approximately 20 per cent by using the amphibian plane in preference to the more common "wheel" type.

In the case of the Loening machine, the plane possesses exceptional sea-worthiness, operates on the ground like a land machine, has a high degree of safety and of visibility, and, above all, in speed, climb and manoeuvrability it performs better than the present DH 4's used by the U. S. Air Mail. It may be mentioned that the Loening machines use the same type of 400 hp. Liberty powerplant as is employed in the DH 4's, although several pounds heavier.

On account of the radical departure from conventional

amphibian design, Mr. Loening stated he had considerable difficulty in persuading the air officials to authorize construction of the first machine. Little could be done until an engine was obtained which would operate in the inverted position. This perhaps is one of the most important features in the design of the Loening amphibians. Loening said Henry M. Crane was interested in the subject of inverted engines for planes in 1919 and that McCook Field, Dayton, Ohio, commenced experiments soon after.

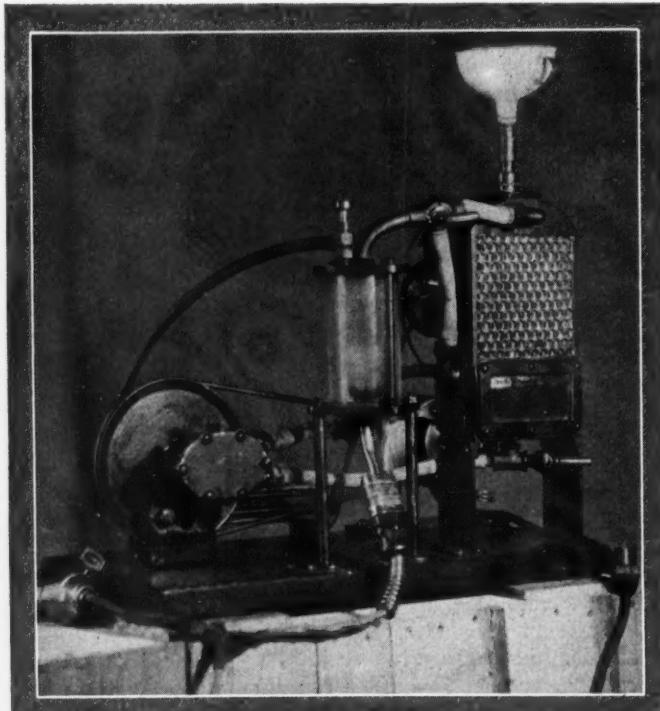
It was not until 1923 that finished designs of the amphibian planes were completed. In 1924 the first full size model was sand-tested and early in 1925 the first complete machine was delivered to the army air service.

The paper dealt primarily with the history of amphibian planes, from the first experiments dating back to one of the original Wright brothers machines which flew over New York City in 1909 with a totally enclosed canoe strapped between the land launching runners in case a landing would have to be effected in the river. In 1911 Glen H. Curtiss made several flights, alighting on land and water with a single float type of plane to which wheels were attached.

Finally, coming to the construction of the Loening amphibian, it could be seen that the design represented a radical departure from any previous type of airplane and by the general appearance of the machine it could be distinguished as a plane combining the desirable qualities of both sea and land planes.

VAPOR COOLING—New System of Temperature Control Soon in Use, Belief

Review of laboratory and road tests indicates steam cooling is approaching point of commercial application to cars.



This apparatus was used to demonstrate the principles of the Rushmore steam cooling system

THAT steam or vapor cooling is drawing near the point of commercial application was demonstrated by the review of laboratory and road tests with the latter in the closest approximation of conditions of ownership by the motoring public. An added feature of the Vapor Cooling Session was a demonstration of the action which occurs when steam is formed on a surface within a liquid. This presentation was made by A. G. Herreshoff of the Rushmore Laboratory, in conjunction with his paper, "Cylinder Temperature Control by Evaporation." In addition, Alex Taub, of the Chevrolet Motor Car Co., and L. P. Saunders of the Harrison Radiator Corp., collaborated in a paper, "The Effect of High Temperature of 'Evaporation Cooling' on Engine and Car Function." In this paper, Mr. Taub presented the results of a broad program of laboratory work while Mr. Saunders discussed the road performance and related subjects.

Throughout the papers and the discussion the undercurrent of the meeting confirmed the idea that evaporative cooling may be regarded as one of the major factors in the solution of the crankcase contamination problem. With this system of cooling, jacket temperatures are held at a consistently high figure which overcomes the water precipitation associated with present cooling methods. With evaporative cooling, the engine warms up in much shorter periods and cools off at a much slower rate. These three influences combine to practically eliminate water from the crankcase. Further, the speakers representing both of the well-known schools of evaporative

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cooling were in accord on many points. Among these were the following:

An engine which is well designed for water cooling can be steam cooled with no difficulty.

Mileage per gallon can be expected to increase by 15-20 per cent, depending somewhat on the class of service.

If no troublesome detonation occurs in the engine while water cooled, this trouble will not develop with steam cooling.

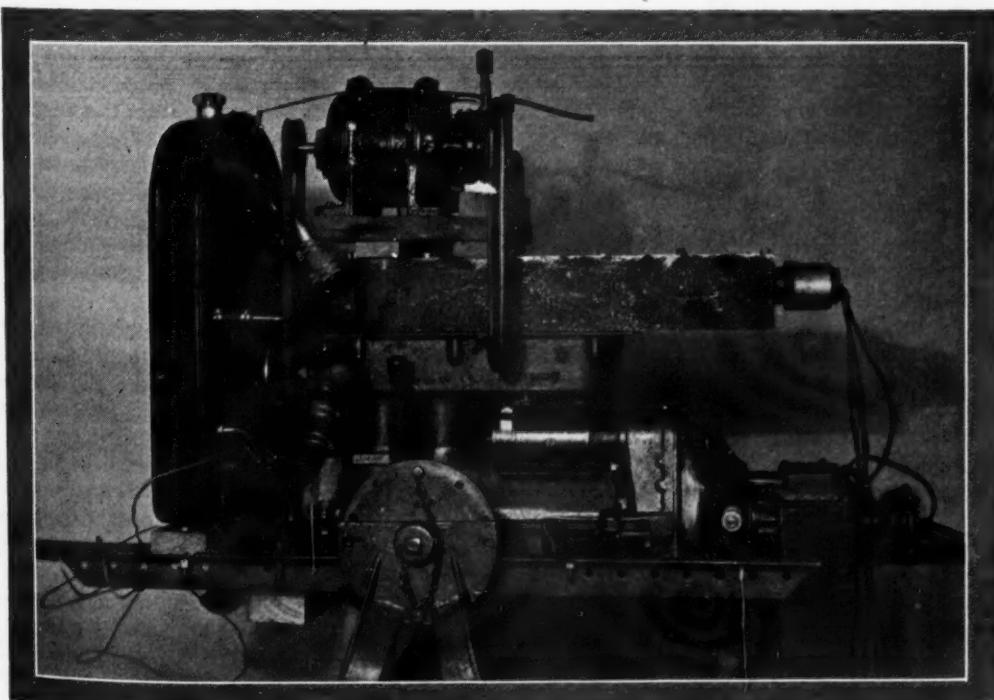
This meeting drew an attendance of about 280 and was lively and to the point due to the guidance of H. L. Hornig, retiring president of the Society, who presided.

In the course of his paper, Mr. Taub showed a con-

siderable number of slides which graphically presented the results of a comprehensive program of laboratory tests. Many of these were made with thermo-couples located in a variety of positions in the cylinder block and the records made with a potentiometer. Comparisons were made between a water-cooled engine, which had been prepared to facilitate the most uniform control of inlet and outlet water temperatures, and a vapor cooled engine. In all cases for varying water temperatures, the parts of the engine, such as valve seats, cylinder barrels, etc., showed a much greater individual variation than when the vapor-cooling system was installed. However, water cooling at 190 deg. outlet temperature approached the almost perfect uniformity of the vapor cooling, but this temperature



Photos by Lazarnick



A powerplant equipped with the Harrison steam cooling system was a feature of the Vapor-Cooling Session

is unsuited for the use of alcohol in winter and will result in continual water loss in summer operation.

Mr. Taub's conclusions were formed on the use of the Harrison condenser having cross flow tubes and auxiliary top tank. Road tests with the same equipment were presented by Mr. Saunders, who covered such points as fuel economy, acceleration, deceleration, etc. In each case the advantage was with the vapor system. In the course of his remarks he stated that no immediate possibility of the reduction of radiator and fan size is offered by the vapor system but that these units in practically the same size in the latter system will produce automatically controlled cooling action with the water at approximately 212 deg.

Full load advantages are overshadowed by those of partial loads of ordinary operation when the vapor system of cooling is used and tests have demonstrated that the normal temperature of this system, 212 deg., is that of most efficient engine operation. These were outstand-

ing statements in Mr. Herreshoff's paper. He stated that the reduction in piston friction alone as the result of higher operating temperature will amount to 50-70 per cent. Better vaporization of the incoming charge is attendant and rusting and crankcase dilution are eliminated.

Charts showing the thermal drop through the cylinder walls and oil film to show that the advantage of the steam formation were presented and Mr. Herreshoff stated that as a general rule, 5 B. T. U. per sq. in. per min. are passed through the walls between the cylinder interior and the water jacket. This transfer is expedited in steam cooling due to the absence of water film on the external surface. Mr. Herreshoff showed the action of steam formation on a vertical surface and the violent agitation by an apparatus which magnified the components and projected them on to the screen. The remainder of his paper was devoted to the description of the Rushmore system, which has been described in detail in *Automotive Industries*.

BODY PRODUCTION—Color Viewed as Potent Factor in Promoting Car Sales

**Speakers stress importance of following current color styles
and discuss nature and source of pigments used.**

COLOR in its entire scope, from the aesthetics of mass and tonal effect as related to style and sales appeal to the sources of pigments and their characteristics and methods of preparation, was the subject of the Body Production Session. Two widely divergent viewpoints were presented by the papers, "The Pot of Gold at the End of the Rainbow" and "The Nature and Source of Pigments Used in Automobile Coloring."

The first was presented by H. Ledyard Towle, an artist well known for his work in the camouflage field during the war and now associated with E. I. duPont de Nemours & Co. The second was presented by C. A. Greene of Valentine & Co. and was illustrated by a series of laboratory demonstrations. Both papers were predicated upon the use of pyroxylin enamel as the body finish. K. L. Herrmann of the Studebaker Corp. presided.

Increasing development of the public's color sense as evidenced by styles for both men and women was advanced by Mr. Towle as a factor which demands closer attention in designing color schemes for automobile bodies. With this factor as a base, automobiles should be regarded as sales entities which must fulfill three requirements—price, performance and appearance—in equal measure. The old idea that cars must be black to conform to the staid or rural demand and be brightened up to meet the supposedly more sophisticated city trade is void. Radio, the automobile itself, and many other influences of modern life have tended to unify the ideas of the entire country and confirm the adage that we are all brothers under the skin.

Colors From Many Sources

Fashionable colors are to be obtained from a variety of sources, one outstanding possibility being the colors of silks and other fabrics which arrive at the great silk houses several months in advance of their distribution as the garb of temporary fashion. According to Mr. Towle, color has arrived in the industry for both the

interior and exterior of the car and the wise manufacturer will shelve some of his conservative blue and black ideas and step out with new and brighter color harmonies.

Every designer works out car appearance from the standpoint of the silhouette and mass effect and these must be maintained by the color harmony. Conservative but still bright effects are maintained by the use of two or three shades of a color with contrasting striping or small panels. Where more striking effect is desirable, the lighter color should be used in the greatest vertical area. This thought conforms to his statement that the panel over the top of the hood and narrow strip above the belt, particularly on open cars, should be relatively dark to avoid an impression of weakness when the shadow cast by the top is considered.

Due to the wide adoption of pyroxylin enamels, the range of available pigments has been reduced, although laboratories have succeeded in developing many substitutes as the result of unceasing work. This was one of the points in the paper presented by Mr. Greene. The natural inorganic pigments have been used since the dawn of history and continue in the paint and varnish field.

The preparation of the pigment and the grinding process which reduces it to the degree of fineness necessary for use with a vehicle are important phases of the production of a color. A number of characteristics are essential in a pigment to insure its use satisfactorily.

During the course of his talk, Mr. Greene produced colors and demonstrated some of the basic requirements of color production. He stated that ultramarine can not be used in pyroxylin enamels at present due to its active chemical properties when exposed to air. Until very recently, maroons also were very troublesome but laboratory work has developed a range of maroons which are entirely satisfactory in service. Already about 1000 colors or shades have been developed for pyroxylin

enamels and with the exceptions mentioned above the color palette offers practically the same range of choice as was permitted by varnish finishes.

Automobile Color Schemes

—H. Ledyard Towle

THE use of colors on automobiles should be based on their relation to the body lines of the car, to country-wide sales appeal and to the fashion and modes of the moment. By proper use of colors short bodies can be made to appear longer, high bodies lower and vice versa.

To make a small wheelbase model appear to have greater length:

1. The part of the body which is actually the longest overall from front to rear should be the lightest in color.

2. The lightest stripe on the car should be along the lower band moulding usually extending from the radiator to the rear.

3. The wheels and upper parts of the car could be of a second color more closely related to the black fenders and splash aprons which are for the present standard on all small wheelbase large production models. The striping on louvers, spokes and upper mouldings should be slightly darker in tone than the striping along the lower band moulding already mentioned.

Here are some rules for making a car appear closer to the ground:

1. Light wheels with dark fenders and splash aprons make a model seem higher off the ground. Dark wheels simply striped make it seem lower.

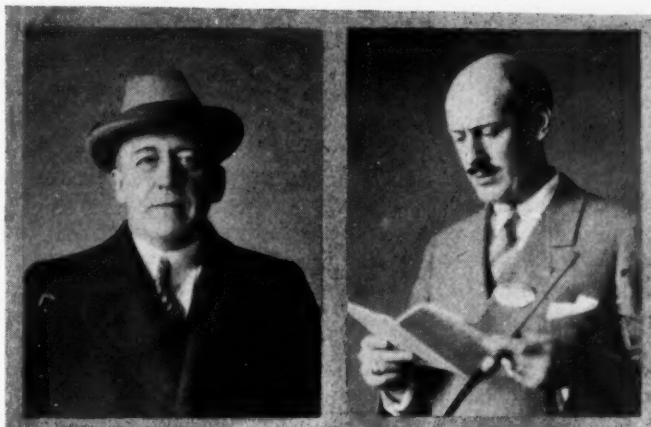
2. The brougham or coach seems lower if the top and body below the lower belt moulding is darker and the shroud and balance of the body above the lower belt moulding is lighter. In the case of the coupe, however, the conditions are reversed.

The roadster and touring car present problems peculiar to themselves. In the case of both it seems wisest to have the lightest color on the lower part of the body below the belt moulding and the darker color above. If a lighter color is used on the upper part of the body above the moulding it has a tendency to make the model look fragile in construction for the length of the body covered by the top.

The more desirable way to treat open cars designed with a belt moulding is to have the darker color above the moulding where it will have the opportunity to blend with the cast shadow of the top, seeming to tie the various planes and forms together and making the construction appear more substantial. To make any model look larger and heavier it is advisable to keep away from sharp contrasts of color which have a tendency to "cut the car up."

Solid black also has the effect of apparently reducing the size of a car. Two closely related tones of gray or beige or light brown will, especially when the fenders and splash apron are also in color, give the car a much larger and heavier appearance.

The car with a carefully considered and beautifully designed silhouette should be finished in a series of closely related colors or tones that will not divide the body into separate pieces like a chocolate layer cake. Look at most Persian rugs; they are full of color and yet the rug as a whole seems dark, rich and simple in tone.



Speakers who discussed automobile body colors at the Body Production Session. C. A. Greene, of Valentine & Co. (left), and H. Ledyard Towle, of E. I. duPont de Nemours & Co.

If the body engineer has done his job well, the car in line and mass and color and tone will present a pleasing ensemble and all things being approximately equal between two competitors—the best appearing car will be sold.

Of all the many colors, tones and tints that one can use, the colors of the moment should be placed upon our cars so that they are always as up to date in their exterior finish as we try to keep them in their mechanical appointments.

And so in designing color schemes for our cars let us think, are they long or short? Can they be made to look lower and speedier? Who will buy them and what are they wearing—and thinking—about color?

Pigments in Body Coloring

—Chas. A. Greene

BECAUSE of the peculiar conditions surrounding the manufacture and application of lacquer finishes to automobiles there are relatively few pigments which are available for use in this work, said Charles A. Greene of the Valentine Co. His address covered the origin and characteristics of pigments and the reasons why certain pigments are more suitable for some kinds of work than others. He cited the blues and maroons as giving the most trouble in general. His talk follows in part:

"The qualities a truly ideal colored pigment should possess are: First, it must be fast to light, or permanent. Second, it must be non-bleeding, or insoluble. Third, it must be solid covering, or opaque. Fourth, it must be brilliant, or of clean tone. Fifth, it must be light in gravity, fluffy, non-settling in enamels. Sixth, it must be soft in texture, easily ground.

"All pigments were originally found in or derived from nature, and many coloring matters have been dug out of the ground for centuries. They are roughly divided into three classes: Inorganic pigments derived from mineral or metallic sources, organic pigments derived from living organisms or coal tar products, and pigments made by a mixture of the two, such as organic dyes precipitated on metallic salts.

"Before we go into the more highly colored organic matters, let us first understand what is meant by precipitating or fixing colors on a base. We all have a faint idea of the dyeing of cloth. For instance, when we wish to dye a piece of cotton fibre a purple color, we saturate the cotton with a chemical mordant which will combine

with the dyestuff and actually precipitate, or bind the dye into the cotton fibre. In making a pigment with the ordinary dyestuff, whether it be a vegetable extract or a synthetic derivative of coal tar, we replace the cotton fibre with a white mineral base, and we precipitate the dye on this white powder in just the same manner as we would fix it on a piece of cloth. This gives us the so-called lake colors.

"Of course, the presence of a mineral or metallic base in these lake colors added greatly to the gravity of the pigment, increased the density, and caused the settling that usually occurs with colors of this sort when made into color varnish.

"The next step in the color industry was to produce a purely organic pigment in which not only the coloring matter would be organic, but the base as well, so that the finished pigment could have the same specific gravity and the same density as the dyestuff itself. Anyone who has ever had any real experience in finishing high grade automobiles will be able to put his finger on the one outstanding weakness in the entire line of pigment colorings on the market. I refer, of course, to the blues in general.

"The great trouble with the blue pigments has been that the one and only truly permanent, brilliant blue, when ground in the ordinary varnishes or lacquers now in use, becomes chemically active and tends to rapidly destroy the vehicle in which it is incorporated. On the other hand, the blues which work well with the various mediums in which they are ground either lack perman-

ency, or are absolutely devoid of brilliancy and beauty of tone.

"The other weak sister in the coloring of automobiles today is found among the maroon pigments. We have a maroon lake known as an Amaranth, which, in a varnish system, was found practically permanent. This same pigment, used in the lacquer type of finish, fades rapidly and is practically worthless. So much trouble was experienced in the early days of lacquer finishes with maroons that one large manufacturer went so far as to state that a satisfactory maroon lacquer was impossible. This has held back their use considerably, and is in no way true. It is possible to obtain maroon lacquer finishes that are just as permanent as anything ever used in the old varnish type.

"When one considers the solvent action of lacquer thinners that a pigment has to withstand today, compared to the mild action of turpentine or mineral spirit in the past, he marvels that we have so many suitable pigments for use in cellulose lacquers. Moreover, the lacquer coating is so thin compared with that of the old varnish color days, that we find the action of light much more severe, and many of the colors that stood up perfectly in the past, had to be eliminated on that account alone.

"However, the pigment palette, as left to us, is more than sufficient for our needs, especially when we realize the countless shades and tints and grays that may be obtained by combining any of the approved pigments with black and white."

BRAKES—Elimination of "Squeals" and Effect of Heat on Linings Are Discussed

Noise traced to improper adjustment and entry of foreign substances which set up ridges on brake drums.

FROM the large attendance and the extensive character of the questions and discussion, it is apparent that the subjects of brake squealing and the effects of temperatures on brake linings are of considerable importance in the industry. Not only did technical brake experts talk but engineers from several bus companies, as well as the operators of truck and taxicab fleets, sought information.

It was generally indicated that most of the noise resulting from brake application comes from two sources, namely, brakes not being in perfect adjustment and the entry of foreign matter into the brakes setting up ridges on the brake drums. The popular theory that most of the squealing issues from rivet heads in the lining coming in contact with the drums was not entirely upheld.

In H. H. Allen's paper, entitled "The Effect of Change of Temperature of Brake Linings on their Performance," it was stressed that in practically every case there is a drop in the apparent coefficient of friction with a rise in temperature of the brake lining material. Where the linings are wetted with oil or water there is a lower apparent coefficient of friction.

Tests were made by the Bureau of Standards on a Rickenbacker touring car which carried the complete apparatus for measuring the temperature of the brake linings. Thermo-couples placed directly in the shoes carrying the lining enables the temperature of any brake to be read or the temperature can be read off the front set

of brakes and correspondingly on the rear set, or again the whole set can be registered. Curves thrown on the screen showed the percentage change in the frictional properties with rise in temperature.

With brakes soaked in oil there is less difference in apparent coefficient of friction than when brakes are water soaked. Tests were conducted on several of the prominent brands of brake lining and the results showed a great variance in performance. This may be attributed to the fact that certain brands of lining are more suited to some brake designs than others. Numerous lantern slides showed the comparative changes in temperature under varying conditions with several brands of lining while the apparatus used in conducting the experiments was shown in detail.

Fourteen methods of possible prevention of brake squealing were mentioned by Dr. F. C. Stanley in his paper on "Causes of and Remedies for Brake Squeaking." Chief among the preventative methods were: The use of castor oil, neatsfoot oil and certain forms of graphite; rubber between band and lining at points of highest pressure; metal shims; rounding of brake bands; using lining with no brass wire; prevention of the entry of grit and steel into the lining; elimination of water; elimination of brass rivets and the use of softer lining.

It was pointed out by Dr. Stanley that squeaks originate as a rule through drum vibration which is undamped by proper contact of the lining with the drum. He said the ordinary drum is a bell with a high pitch which yields

its tone when in contact with friction material. Damping may be best accomplished by so shaping the band that sufficient contact may be formed as to prevent vibration.

Many interesting views were brought out in the discussion in which the representatives of several brake lining manufacturers participated. Grabing brakes apparently have been causing considerable trouble and in most cases were experienced in the early morning. This was explained by the fact that sometimes cars and trucks are washed during the night and the lining swollen, through the entry of water into the brakes, caused the condition, while the forming of rust spots on the drum resulted in squeaking at times.

One speaker stated that he noticed the greatest squealing occurred on those cars which had the lightest weight braking mechanism and recommended that heavier connections be employed. Trouble had also been cured, he said, by proper lubrication of the clevis pins.

Squeals in Both Types

In answer to a question by Carl Breer, chairman of the sessions, Dr. Stanley said that squeals were divided about 50-50 between the external and internal types of brakes. A representative of the Fifth Avenue Coach Co., N. Y., stated that brake squealing on certain buses had been cured by removing a portion of the lining directly opposite the opening. He remarked that frictional electricity generated in the braking system on several buses had given the passengers a shock when they caught the rail to enter or leave the bus.

Two constructive suggestions were made with regards to brake lining. If the lining is secured to the band in sections (as is employed in a few cases) the bands are given greater opportunity to flex with the consequent improvement in effectiveness. Furthermore, it was recommended not to make the rivets flush with the lining but to have the heads countersunk at least $1/16$ of an inch.

While aluminum rivets have proved satisfactory, specially during the war when copper and brass were not available, their extensive use is not recommended.

Mention was made of a metal brake lining manufactured on the Pacific coast and it was said that metal to metal contact had proved successful on several vehicles for a number of years.

Cures for Brake Squealing

—F. C. Stanley

F. C. STANLEY of the Raybestos Co. stated that as the result of tests made with a Carson brake lining machine the cause of brake squeals was determined to be undamped or unmuffled drum vibration caused by the plowing action of metal or grit in the lining. Possible remedies suggested were, using drums of higher carbon content to prevent plowing, making brake bands round to equalize pressure and sinking rivet heads $1/16$ in. below the surface of the lining. Mr. Stanley's talk, in part, follows:

"Brake squeals are not confined to any one type of brake or any particular brand of lining. They may be heard whenever traffic is checked, and the desire to stop this noise has increased with the elimination of other noises on the car.

"It is probable that more cars have been relined recently because of squeals than because of worn condition of the lining, and nearly every repairman has his pet lining as a remedy for the trouble, while all lining manufacturers are chasing squeal complaints.

"The Carson brake lining testing machine offers in a simplified brake a means of studying the cause of squeak. As but a small area of lining is in contact with the drum, the drum is permitted to vibrate as a whole



Photos by Lazarnick

What makes a squealing brake squeal? Dr. F. C. Stanley (left) answered this question at the Brake Session and also gave the remedies. Carl Breer (center) was chairman of this session. H. H. Allen (right), of the Bureau of Standards, contributed a paper on temperature in relation to brake-lining performance

when scratched at any point on the surface of the lining. Lining containing no brass wire is uniformly silent, Lining containing brass wire is silent until wear produces metal contact. Squeal is produced by the plowing action of a bit of wire in a furrow or while making a furrow in the surface of the drum. This noise may be stopped by slightly changing the position of the shoe so that the abrading particle no longer works in the same groove or by smoothing the surface of the drum with fine emery cloth which destroys the furrow, or by applying pressure to the drum at a point exactly opposite the cause of vibration.

"These observations lead us to a theory as to the cause of brake squeal. This theory may be stated briefly as follows: Brake squeal is undamped or unmuffled drum vibration caused by the plowing action of metal or grit in the lining.

"It is obvious that the use of lining without brass wire is not to be considered. Asbestos yarn has a very low

tensile strength and brass wire was originally introduced to make it possible to weave the yarn into a compact fabric.

"We can prevent the imbedding of steel from the drum by using drums of higher carbon content. With 10 to 20 points of carbon drums are scored at 750 deg. fahr. With 40 to 50 points carbon scoring occurs at about 900 deg. fahr., a drum temperature seldom reached. The use of drums of higher carbon content will remove one of the sources of abrading particles. Grit may be largely excluded by the use of internals or by shields on externals, but grit may be removed by flushing.

"For the manufacturer there remains but one remedy or means of prevention. Round bands so that pressure is uniformly distributed. Sink rivet heads 1/16 in. below the surface of the lining, and use drums of higher carbon content. A softer lining requires more frequent adjustment and is less durable. In use it becomes hard lining of decreased thickness."

ENGINES—Diesel Type Motor Used Successfully for Automobile Operation

Development described by A. C. Attendu. Fresh oil lubricating systems discussed by T. E. Coleman and J. B. Fisher.

DISCUSSION of the relation between lubricating system and engine performance by T. E. Coleman, Madison Kipp Corp., and description of the Attendu flexible high-speed crude oil engine were the topics of the engine session.

Many difficulties have been encountered in the construction of the Attendu engines, as a very accurate quantity of fuel has to be injected into the cylinders at the right time to obtain smooth running, efficiency and best fuel economy.

After completing a very successful four-cylinder Diesel type engine which has been used constantly in an automobile for a long period, another engine of the two-cylinder type has been built at the request of the Navy Department for installation in dirigibles and is now undergoing tests at the Aeronautical Engine Laboratory, Philadelphia Navy Yard.

Attendu's automobile engine is of the two-cycle type of 3½ in. bore by 5½ in. stroke. At 1400 r.p.m. the engine develops 56 b.h.p., running on 18-22 deg. Baume fuel oil, with the fuel consumption .76 lb. per b.h.p. Maximum r.p.m. is 1800 with an idling speed of 120 r.p.m. In running order the weight is 17 lb. per hp.

Two-Cylinder Aero Engines

The aero engine which has run for over 150 hours without a miss employs two cylinders and develops 91 hp. at 1525 r.p.m. The total weight is 417 lb., or 4.6 lb. per b.h.p., and with certain modifications which are being made, the weight is expected to be reduced to 3.6 lb. per hp., while the maximum r.p.m. will be pushed up to 2200. The basis of the theoretical requirements in the design are carefully gone into in the paper read at the meeting by A. C. Attendu, of the Eastern Engineering Co., Ltd., entitled "The Attendu Heavy Oil Engine."

Fresh oil systems and the combination fresh oil and recirculated oil system formed the chief topic of the

paper on "The Relationships between Lubricating Systems and Engine Performance," by Mr. Coleman and J. B. Fisher, Waukesha Motor Co. Mr. Coleman, who presented the paper, stated that many of the tests, some lasting several hundred hours under varying conditions, had been made on some 12 engines during the last five years.

The conclusions and observations were shown graphically by numerous curves and diagrams while the special pumps or feeders necessary with various forms of "fresh oil" systems were available for inspection by the some 400 members attending the sessions.

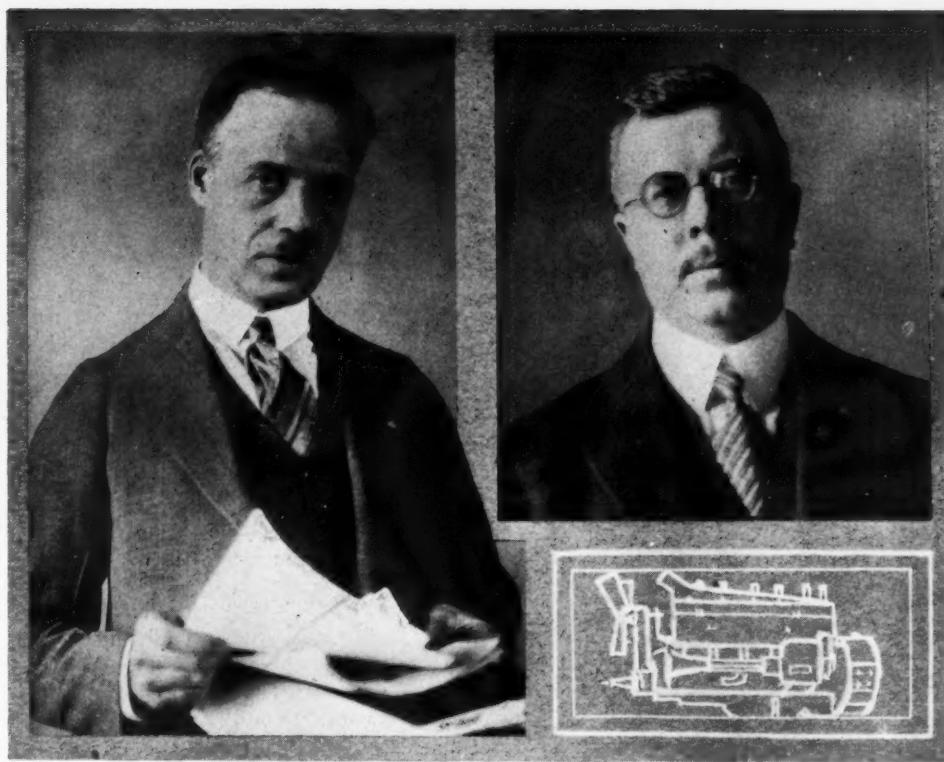
An interesting statement from Mr. Coleman's talk indicated that the finish of cylinder walls is an important factor in high speed engines. Among the several advantages claimed for the "fresh oil" systems are: Decrease in escape of gas past the piston with the consequent reduction in dilution; increase in power; smoother operation.

In adopting the "fresh oil system" it is not necessary to change viscosity or brand of oil, and Mr. Coleman surprised several oil company representatives present by stating there is little change in operating conditions when using the different brands of oil. Lack of time prevented discussion on the lubrication paper.

Following the reading of Mr. Attendu's paper, several of the questions put to the speaker brought interesting replies. Low temperatures do not affect the starting of the Attendu engines, and it is claimed they start easier and quicker than the conventional automobile power plants. The 18-22 deg. Baume fuel does not commence to thicken until temperatures of approximately 10 deg. below zero are encountered. The engines start easier in cold weather than any automobile engines he knows of, said Mr. Attendu.

One of the most interesting features of the discussion was Mr. Attendu's answer to a question as to the amount of carbon formed in using such a heavy oil. After the

An interesting description of development work in connection with heavy-oil engines was given by A. C. Attendu (right) at the Engine Session. In the absence of J. G. Vincent, Lionel M. Woolson (left) acted as chairman of the session



Photos by Lazarnick

engines have been running several hours the heads are said to be perfectly clean, and after constant running there is virtually no trace of carbon, he said.

Starting is accomplished by a 6-8 volt Bijur electric starter engaging with the flywheel, but it is intended to fit the 12 volt system, he said. Approximately 1 to 1½ hp. are required to start the engine. Mr. Attendu was called upon to give a more detailed account of the injector mechanism, and in his explanation stated that the maximum injection pressure were around 6000 lbs. sq. in.

In concluding L. M. Woolson, of the aero engine division of the Packard Motor Co. and chairman of the session, proposed a rising vote of thanks for the paper presented by Mr. Attendu.

High-Speed Diesel Engines

—A. C. Attendu

A. C. ATTENDU, president of the Eastern Engineering Co., Ltd., of Montreal, had something to do with early development work on Diesel engines in France and therefore is familiar with the difficulties encountered with this type of engine. In 1921 he built an engine designed for automotive work. It was a four-cylinder two-stroke engine of a bore of 3½ and a stroke of 5½ in. and worked with air injection, the air being compressed by a small two-stage compressor to 1200 lb. p. sq. in. The compression ratio was 11 to 1, the compression pressure 300 lb. p. sq. in., fuel oil of 18-22 deg. Be. was used and the engine was expected to develop 40 hp. at 1600 r. p. m. However, it developed only 11 hp. and the fuel consumption was nearly 2 lb. p. hp-h. It was also rather hard to start, owing to the comparatively low compression and the cooling effect of the injection air.

Another engine of the same general type and the same cylinder dimensions was then built, but with solid injection, whereby the two-stage compressor and the inter-cooler were eliminated. This, as well as the earlier engine, had stepped cylinders for compressing air for scavenging

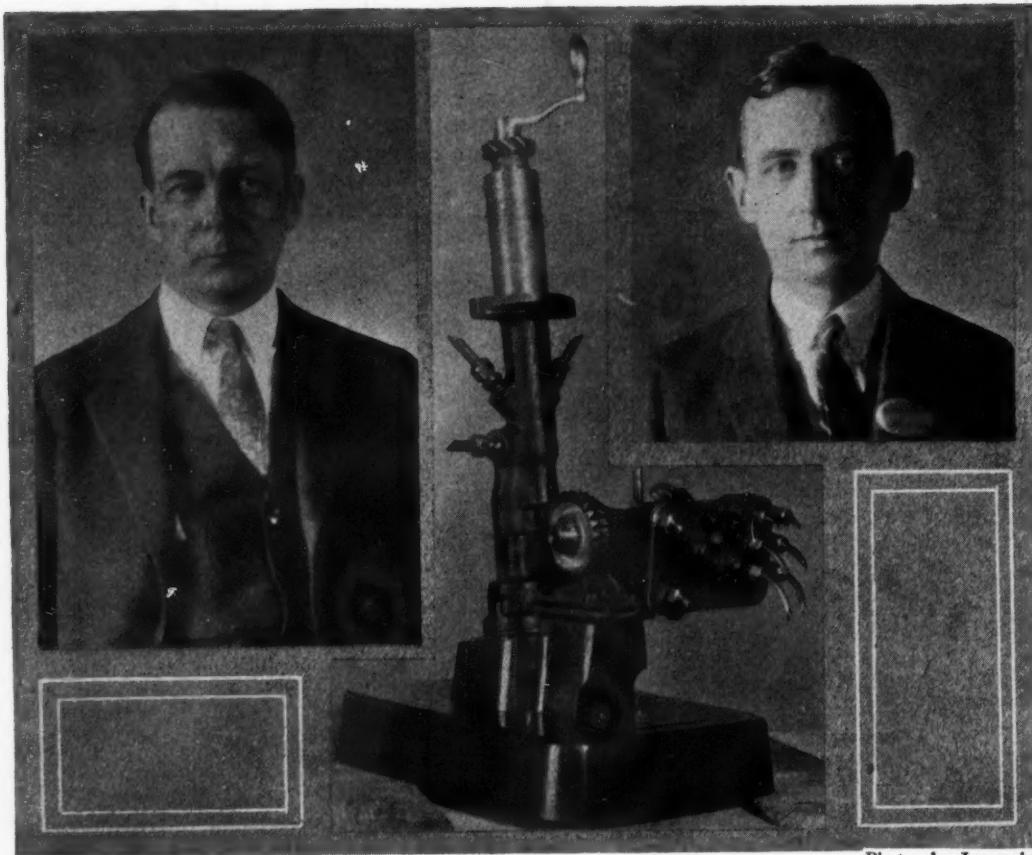
the working cylinders. The compression ratio was raised to 13 to 1, bringing the compression up to 405 lb. p. sq. in. This engine developed 18 hp. at the start. The intake of the scavenging cylinders and the exhaust from the working cylinders were controlled by rotary valves. These were replaced by poppet valves, two per cylinder, and two valves were placed in the transfer passage, instead of a single one. These changes brought the engine power up to 36 hp.; by further changes, chiefly on the scavenging compressors, the power was increased to 46 hp. and finally it was raised to 56 hp. by trying different adjustments of the fuel pump and injector. The engine peaked at 1400-1425 r. p. m., had a specific consumption of 0.76 lb. p. hp-h. and could be throttled down to 120 r. p. m.

It could be readily started by means of a 6-volt electric starter, after a few revolutions, on 18-22 Be. fuel oil. Three engines of this type were built, one of which was fitted in a car and driven some 3000 miles, 2000 miles of which was on a dirt track at an average speed of 27 m. p. h. and with a fuel consumption of one U. S. gallon per 20 miles, the car with load weighing 5100 lb.

In October, 1923, one of the three engines was taken to Washington, and in August of the following year the Eastern Engineering Co. obtained a contract from the Navy Department for a two-cylinder experimental engine suitable for aircraft work. This engine was designed to operate on the same principles as the smaller four-cylinder. Its cylinders had a bore of 5½ and a stroke of 6½ in. and it was designed to develop 100 hp. at 1500 r. p. m., a weight limit of 3.8 lb. per hp. being imposed.

This engine was delivered in February, 1925, but lubrication and minor mechanical troubles developed, which delayed the acceptance test until November, 1925. The best output obtained in the engine testing laboratory in the Philadelphia Navy Yard was 85 hp. at 1620 r. p. m. The requirements of the navy were met successfully and the navy took title to the engine in November last.

After describing the various elements of his engine in detail Mr. Attendu drew the following conclusions: The tests made with this engine definitely establish the fact that light material can be used in the construction of



Photos by Lazarnick

J. B. Fisher (left) and T. E. Coleman read a paper on the relationships between lubricating systems and engine performance and exhibited their fresh oil lubricator at the Engine Session

heavy oil, high speed engines, and also that this type of engine is no more difficult to build than the present gasoline engine. Comparative data collected from the running of the small four-cylinder, and the experimental aviation engine, allow us to calculate and design engines of any size with any number of cylinders and be able to have a good approximation of the results. The applications of the light, high-speed, heavy-oil engine are enormous, including pleasure craft, tugs, tractors, buses, rail coaches, trucks, airships and—not very far away—automobiles.

Fresh Oil Lubrication

—*J. B. Fisher, T. E. Coleman*

J. B. FISHER of the Waukesha Motor Co. and **T. E. Coleman** of the Madison-Kipp Corp., in their paper dealing with systems of engine lubrication in which either the cylinders alone or all of the bearing surfaces are lubricated by fresh oil, described tests with both of these systems.

When the "full fresh oil system" is employed, the installation usually provides a mechanism for properly metering oil and forcing it through leads to the cylinder barrels, the main bearings, crank pin bearings, and timing gears. The oil is injected into each cylinder at a point opposite the first bridge wall of the piston at the down center position of the piston. An oil lead carries the lubricant to each main bearing and to a centrifugal ring placed on the crankshaft cheek for the purpose of throwing the oil into the crank pin drilling, through which it is carried to the crank pin bearing. The lubricator mechanism is driven from the camshaft so that it operates automatically with the engine speed, thereby delivering lubricant in quantities which vary directly with the speed of the engine. The lubricator is mounted on the side of the engine and driven from the camshaft

through an intermediate horizontal shaft. The pumping unit is carried in the tank. With the combination system the lubricator can be mounted inside the crankcase, so the appearance of the engine is not changed.

The oil inlet to the cylinder is in the form of a drill hole through the cylinder wall which is opposite the top land of the piston when the latter is in the lower dead center position. A slight groove is tooled into the cylinder wall at this point, of a width equal to one-fourth the width of the piston ring, and the same depth. The lubricator is of the impulse type, and it was found that five impulses per 1000 r. p. m. was suitable for cylinder lubrication.

A comparative test run was made with a six-cylinder 75 hp. passenger car engine with pressure lubrication through a hollow crankshaft, the engine being kept running at 1500 r. p. m. and at constant temperature. The amount of oil in the crankcase decreased at the rate of two pints per hour when the engine was idling. At one-fifth load the consumption was one pint and eight ounces per hour while at two-fifths load the hourly consumption had dropped to one pint and three ounces. The full load run showed that under this condition the engine uses only eight ounces of oil per hour or one-fourth as much as when idling.

Results With Fresh Oil System

This same engine was next equipped with a fresh oil system for cylinder lubrication, retaining the flood system for the bearings at the same time providing baffles under the cylinder barrels to keep the circulated oil away from the cylinders and pistons. The pistons required eight ounces of oil per hour at a speed of 1,500 r.p.m., and, of course, there was no variation in this quantity from idle to full load, due to the fact that the amount of oil delivered to the engine depends directly upon the engine speed.

It was asserted that under certain conditions at least fresh oil lubrication will reduce detonation.

MOTORCOACH—Designer's Chief Aim is to Provide Comfort for Passengers

Operating costs and maintenance next in importance. Heating and ventilation are vexatious problems for builders.

WHAT does the riding public want and what will best meet the requirements and convenience of the passengers? That this is the criterion of bus design in all phases was the keynote of the papers presented at the Motorcoach Session. This statement was crystallized in so many words by Frank R. Fageol's paper and was confirmed by the speakers from the International Motor Co., A. F. Masury and L. C. Josephs, Jr., who covered such features as the elimination of vibration and heating and ventilation.

Of only slightly less importance are the questions of operating costs and maintenance, as in order to fulfill the constantly increasing demand for motorcoach transportation service, the operator must keep his vehicles running at a profit.

Concerning the relative future of the gas-electric and the gearbox type of coaches, Gordon Lee, who presented Mr. Fageol's paper, stated that the question of public taste and choice will be the determining element. Because of association with the mechanical experts of street railway companies, he stated that in his opinion the gas-electric type may be a great influence in breaking down the diminishing wall of prejudice against the motorcoach which has existed among railway executives and further, that bus or motorcoach transportation is a natural monopoly and thus will ultimately come under government supervision as other existing public utilities and in the process will come into its deserved position.

Historical Review of Safety Coach

Briefly, Mr. Fageol's paper recited the historical and mechanical background of the Safety Coach. About six years ago, he and his associates started out with the idea of shortcircuiting the process of evolutionary development from existing forms of transportation. In the process, the development of the railway engine from its earliest form to the present reliable mechanical unit and the transition from the stage coach to the steel car of today were examined, as was the growth of the modern passenger car from the earlier one-lunger. The psychology of the public's attraction to any given form of transportation was an important part of this analysis.

Passenger comfort was the subject of Mr. Masury's talk, which was illustrated by a number of lantern slides showing the application of rubber to many points of the bus. In his opinion, the cushioning of units and prevention of the transmission of vibration from one unit to another and possibly remote unit is just as important as are the pneumatic rubber tires that are essential parts of all modern buses. In conjunction with this idea he also showed and explained two instruments which have been developed for the study of transmitted vibrations, the source of which may be road shock or one of the mechanical units. Both of these instruments are recording and have some of the characteristics of the seismograph. Their use has had great effect on the entire design and

has taken the question of spring suspension out of the field of personal impression.

To illustrate the application of these ideas, Mr. Masury showed and described the application of the rubber shock insulators to the spring ends. Similar compressed rubber insulators have been placed at the engine support arms and in a recent design compressed rubber bushings are placed on the radiator brace rods. The gas tank has been found a great source of transmitted vibration and a late design has this unit carried in straps which terminate in rubber bushings. A propeller shaft brake assembly has been mounted in shock insulators inside of the body, rubber blocks are used in a new aluminum seat structure to provide additional cushioning and insulation from vibration. This adaptation also has some effect in reducing the inertia effect on the passenger when starting and stopping.

Heating and ventilation as important factors in the comfort problem were discussed by Mr. Josephs in his portion of the paper. He stated that practically all parts of this country require some heating provision but that present bus heating and ventilating facilities are most inadequate. While the low figure of 350 cu. ft. per hr. per passenger is sufficient ventilation for the bus, its attainment is not easy as for a single deck, 29-passenger body about 16 transfers per hour, of the total volume of the body are involved.

Basically, heating is in about the same class as ventilation. No one source is adequate unless oil or coal heaters are considered and these require too much floor space and attention. The engine exhaust contains several times the required amount of heat but only a fraction is available for heating purposes. The restriction in this case is the high temperature of the exhaust, which may be 1100 deg., although a maximum of 200 deg. or slightly more is needed for the heating system.



L. H. Palmer (left), chairman of the Motorcoach Session, and L. C. Josephs, Jr., who give it as his opinion that present bus heating and ventilating facilities are most inadequate

PRODUCTION—Group Bonus System Successful With Non-productive Labor

Joseph Lannen describes method in force at Paige-Detroit plant.
Motion pictures show steps in steel body construction.

THE group bonus system of wage payment can be applied successfully to non-productive labor, although points of difficulty may arise here and there in its operation.

The indirect character of tool room, maintenance and machine repair work makes somewhat difficult the application of this form of payment, but it can be done so long as the management is willing to give consistent supervisory attention to the foremen and the men as estimators in setting the time for jobs on which the bonus is to be based.

These were conclusions which may be drawn from the discussion of this phase of wage payment which was the chief feature of the production session at which Joseph

the job is substituted. At the end of each pay period an estimate is submitted for the actual number of hours worked by each foreman who participates in the bonus. An estimate covering the actual number of extra hours allowed for overtime is forwarded to the time department at the end of the pay period.

Training of estimators and accuracy of estimates is, of course, an important phase of the system since time study methods are not feasible. Applied in the tool room however, checking of estimates is possible by getting quotations from outside tool shops, while experience in the maintenance and machine set up fields makes possible estimates which are accurate and fair enough to make the system entirely workable. On some jobs the workers beat the estimates by a considerable per cent, Mr. Lannen said, but on others they beat them by very little.

Slow workers and inefficient workers are at a great disadvantage under this system, Mr. Lannen pointed out, and said that the only remedy for the dissatisfaction caused by the presence of such a worker usually is his elimination. The method also makes the men push the foreman for work.

Not Hard to Install

The plan was not hard to install, Mr. Lannen said, because the bonus is paid in addition to the regular day rates which the men were earning before the new plan was put in back in May, 1924. He believes that it would be difficult to substitute the Paige plan for the form of bonus which is given to men gratuitously or to make the bonus a substitute for part of their former earnings.

The plan tends to increase rather than decrease labor turnover, Mr. Lannen thinks, but also he believes that it tends to increase the percentage of individuals who remain with the company over a long period of time. The company gains its benefit from the increased speed with which various jobs are done. The whole plan still is more or less experimental, Mr. Lannen said, but stated that it had been quite successful in a general way.



Left: William J. Mayer, who gave an illustrated talk on the production of all-steel passenger car bodies. Right: Joseph Lannen told of the application of a group bonus wage payment system to non-productive labor in the Paige-Detroit plant

Lannen, Paige-Detroit Motor Car Co., read a paper on "The Application of Group Bonus to Non-Productive Labor" and W. J. Mayer, E. G. Budd Manufacturing Co., exhibited motion pictures showing the processes now used by that company in making steel bodies.

The system used for paying maintenance, machine repair and tool room men by group bonus in the Paige organization, Mr. Lannen outlined as follows:

An order is issued for each job. It is then estimated and a copy of the estimate and order number is forwarded to the time keeping department in which the work is done. The workman's time is kept for each job and at the end of the pay period the actual and estimated time for all jobs completed in this period are totalled. If the actual time is less than the estimates this difference is prorated among the group, based on their earnings during the pay period. If the time taken to do the work is greater than the estimated time the men are paid their day rate.

If a job is cancelled the original estimate is cancelled and an estimate for the actual number of hours applied to

F. A. Whitten, chief engineer, General Motors Truck Co., is new chairman of the S. A. E. Standards Committee





Photos by Lazarnick

Left to right: D. M. Pierson, who described the Dodge refrigerated test chamber at the Research Session; F. O. Clements, chairman of the session, and J. O. Eisinger, of the Bureau of Standards, whose paper dealt with engine starting tests

RESEARCH—Progress Toward Satisfactory Year Round Driving Conditions Outlined

Operation of engines at low temperatures discussed. D.M. Pierson describes Dodge Bros. refrigerated test chamber.

PROBLEMS connected with the operation of automobiles at low temperatures and the progress made to effect satisfactory driving conditions the year round were reviewed in two papers and the discussion following at the Research Session, at which F. O. Clements presided.

Preceding the talks on fuel analysis with respect to cold weather starting, there was an interesting paper profusely illustrated with lantern slides on the construction and operation of an improved type refrigerated laboratory wherein a complete automobile or powerplant may be tested and observed while in constant actual operation at temperatures as low as 40 deg. F. D. M. Pierson of Dodge Brothers, Inc., whose paper was entitled "An Improved Type of Refrigerated Test Chamber," acknowledged the indebtedness of Dodge Brothers, Inc., to the General Motors Research Corp. for certain data in respect to the construction of the test chamber particularly as to the minimizing of frost through the elimination of moisture. A floor type chassis test stand connected with an electric dynamometer, the latter being outside the chamber, enables winter driving conditions at speeds of 35 to 40 m. p. h. to be simulated. The air furnished by a blower passes over the ammonia coils 11 times per minute and can be directed against any part of the car or room while a separate lead furnishes cold air directed against the car radiator at a velocity of 35 m. p. h.

Practically all investigations of low temperature operation such as engine starting and warming, storage battery tests, lubricant tests and the effect of cold air on

finishes can be regularly observed. Discussion following the paper centered around construction and characteristics of the test chamber.

Gasoline fuels as relating to the starting of automobile engines in cold weather were analyzed by J. O. Eisinger, Bureau of Standards, in his paper on "Engine Starting Tests." In most of Mr. Eisinger's research a four-cylinder truck engine was employed which was cranked at a constant speed of 100 r.p.m. by an electric dynamometer. Various fuels were tested and the time and number of r.p.m. as well as the quantity of fuel used were noted between the introduction of the fuels at the jet and the first explosion in the engine.

Distillation curves of all fuels tested were shown on the screen. In the cases of two fuels whose curves cross at the 5 per cent point, one fuel shows the tendency to start quicker with certain rich mixture ratios while under other conditions and temperatures a lean mixture ratio shows the tendency to start easier.

The correlation of Mr. Eisinger's physical tests and the results of the laboratory research were demonstrated in a series of experiments conducted before the meeting by T. S. Sligh, Jr., Bureau of Standards. In the main Mr. Sligh's experiments showed the proportions of fuels forming combustion mixture at various temperature levels.

In the discussion following the paper and experiments, Henry M. Crane outlined the history of fuel research beginning with the idea of first securing the greatest

mileage from a barrel of crude oil. It was found, Mr. Crane said, that crankcase dilution opposed the use of low volatility fuel and when the dilution problem had been solved, it was found that bad starting effects resulted. The greatest problem Crane said was to determine the starting and average volatilities of the fuel and with the present research work that is being done the method is very promising.

Factors in Engine Starting

—J. O. Eisinger

WITHIN certain limits the richness of the mixture determines the number of revolutions that an engine must make before an explosion is obtained. The richness of the mixture referred to is based upon the fuel content of the mixture leaving the carburetor, which is not necessarily the fuel content of the mixture in the cylinder.

During the past year the cooperative fuel research has consisted for the most part of a study of engine starting.

The test procedure was as follows: The engine was driven by a dynamometer at a constant speed, and with the fuel supply shut off. When engine conditions had become reasonably constant fuel was turned on and the time required to obtain an audible explosion was taken by a stop-watch. This was considered as the starting time. Then the fuel was shut off immediately, and from the reading of a burette, which was used to measure the

fuel delivered to the jet, the total amount of fuel used in starting the engine was determined. The starting time and the amount of fuel used were obtained for different rates of fuel flow from the jet. In presenting the results these different rates of fuel flow, which correspond to different mixture-ratios, since the engine speed was constant, were compared to the time required for starting.

The minimum amount of fuel vapor necessary to form a combustible mixture with air is essentially the same for all gasolines. It follows then that there would be no difference in the starting performance of these fuels if the temperatures were sufficiently high so that practically all of the fuel was vaporized in the air-fuel mixture. The temperature of complete vaporization in an air-fuel mixture is far below the temperature of the end point of the distillation curve and is probably, for the fuels here considered, below 70 deg. C. (158 deg. F.). The fact that different amounts of the two fuels are required to produce starting in a given time indicates, therefore, that at the temperature of operation, different amounts of the two fuels are vaporized. This is suggested by the distillation curves which show that there are differences between the two fuels below the 85 per cent point, which differences become proportionately greater as the temperature is decreased.

The influence of the low boiling constituents on starting characteristics is also shown by a comparison of the two fuels. These fuels have the same distillation characteristics up to the 10 per cent point. With an air temperature of 6 deg. C. (43 deg. F.), they gave approximately the same starting performance.

STANDARDS—29 Proposals Approved; No Action on Oversize Piston Rings

Numerical designation of ball bearings is revised to clear up confusion caused by same numbers for different types.

AFTER several rounds of free-for-all debate on the first two or three subjects up for approval, the Standards Committee observed the lateness of the hour and to all effects imposed the well-known cloture rule upon itself. Out of the process came the approval of all but one of about thirty proposals. The sole exception was the recommendation on oversize piston ring standards which was returned to the engine division for further consideration on the basis that the committee was not in favor of the establishment of two slightly different standards for engines in which general practice is identical.

Probably the most outstanding action was that taken on the revision of the numerical designation of ball bearings which clears up the confusion caused by the same numbers for single row, double row and angular contact type of the older standard. In conjunction with this action, the new 200 series covers the wider type of radial bearing which has been in production by several bearing companies for some time. The older, narrower type was criticized due to the lack of sufficient metal for the best strength conditions. Also the question of corner radii was settled by establishing the maximum dimension of the radius which can be turned on the shaft or in the housing. This action follows the lines of international standardization effort and still allows some latitude of practice for the ball bearing manufacturer.

In the field of tractor standards, belt speeds were

simplified and made to conform with those of the Agricultural Engineers and the National Association of Farm Equipment Manufacturers. The new belt speed standards are 2600, 3000 and 3500 f.p.m. Standard tractor testing forms were changed to a correction figure of 29.92 in. of mercury at 60 deg. F. The belt and drawbar horsepower percentages were modified so that no change will be made in present ratings.

Nomenclature changes were made in the electrical engine and battery divisions. The patching of leather when of the same grade and invisible from the finished side, was approved. Specification 00 for large sizes was added to the flywheel housing list and cone clutch flywheels were dropped. Standard sizes for engine trunnions were approved.

Detailed changes and additions were made in the practice referring to the following items: screw type electric lamp connectors particularly for bus service, tail lamp mounting, flexible disks for propeller shafts, ball handle threads, truck frame widths, spark plugs and fuse clip radii. Specifications pertaining to reverse position latches for gear shifts of trucks, the three-joint propeller shaft recommended practice of 1922, and the battery instructions of 1913 were cancelled. Motor coach batteries were simplified and the number of standard sizes reduced to seven and the dimensions of monobloc battery containers were revised. The power take-off recommended practice was confirmed as a standard.



General view of the Coliseum. A Spanish setting was used in Chicago and with the generally brighter colors of the cars, presented a most attractive display.

"Sell 'Em at the Show," is Slogan of Exhibitors in Chicago

Special merchandising effort characterizes opening of annual "Windy City" show. Nash, McFarlan and Roamer display new models. Salon is held at Drake Hotel.

THE Chicago Automobile Show opened Saturday, January 30, with a larger attendance than ever before and with unusually active merchandising effort on the part of exhibitors and their salesmen.

The Coliseum and Annex, the site of past Chicago exhibits, was newly decorated for this year's event. Careful preparation of salesmen on the part of many exhibitors and more attention than in the past to specific planning of show merchandising activity was evident from study of methods being used at the various booths. With relatively little that was new from a design or mechanical standpoint not already displayed in New York, the particular emphasis placed on proper handling of show selling becomes perhaps the chief feature of interest at the Chicago exhibition from a trade standpoint.

Analysis of the parts and accessory exhibits shows a noticeable absence of exhibitors of certain important types of unit. Batteries, brake lining, piston pins and tires, for example, were not shown by anyone at Chicago, while the amount of service equipment and replacement parts on display was so small as to be negligible. Only one exhibit appeared of such items as spark plugs, gaskets and gears, while the units leading in number of exhibits were bumpers, with 18, and shock absorbers, with 12.

This lineup might indicate a growing tendency on the part of those whose products have only a trade interest to stay out of the show, and on the part of those who can make a direct appeal to the public to stay in.

The efforts to put over the trade-days at the national shows, of course, constitute a sound attempt to make the shows more attractive to those who are interested chiefly in reaching dealers, manufacturers, distributors and jobbers. It cannot be said that any overwhelming success attended those efforts in New York this year, and for that reason the parts and accessory phases of the Chicago exhibit are being watched with interest by those involved in working out future merchandising policies in the industry. Parts and accessory exhibits number about 250.

Forty-nine passenger car makers and eight taxicab producers are exhibiting in Chicago this year, the total number of cars in the show totaling about 300. Most of the models are identical with those exhibited in New York a few weeks ago, the only additional jobs being new body models shown by Nash, McFarlan, Roamer and Bauer taxicab.

Nash Special Four-Door Sedan

The new Nash product is a four-door sedan known as model 239 on the Special Six chassis. It sells for \$1315 f.o.b. This is the lowest priced four-door sedan ever offered by Nash. The body is Nash-Seaman built and is finished in teal blue. The general low lines of the body are accentuated by a black body beading. A thin gold stripe under the beading and on the hood louvres adds to the effect.

The upholstery is plaited. All interior hardware is sil-

ver finished in a Colonial design. The width of the rear fenders at the extreme top is five inches, the remaining space of what ordinarily would be the fender being the body overhang.

There is a large rear window and the rear upper body panel is rounded to a point where it intersects with the fabric covering of the top. Also the drip molding is carried around the top and extends along the sides of an integral sun visor. The radiator is finished bright, while the headlamps, fenders and side shields are black. The window molding also is black. Complete equipment is included in the price.

New Enclosed Roamer

Roamer is showing a new enclosed car known as the Special Big Straight Eight sedan, a model which will constitute the chief item of the Roamer line. This is mounted on a 125-in. wheelbase and is offered at the price of \$1995 f.o.b. The car is fitted with a conventional three-speed gearset of Brown-Lipe make. Lockheed hydraulic brakes are standard.

Elcar has a special model on its 132-in. wheelbase, seven-passenger sedan finished in old ivory and black. This car sells for \$2785 f.o.b.

McFarlan is exhibiting two body models not previously shown, a utility coupe and a brougham. The former is finished in a light blue and a touch of color has been added by painting the brake drums vermillion. Spanish leather is used for upholstery and there is a spacious compartment back of the front seat as well as a golf compartment and luggage space under the rear deck. In addition to this a rumble seat is provided. The powerplant is an eight-in-line engine. This car as well as the other McFarlan models is equipped with the Lorraine driving light as standard equipment. Houdaille shock absorbers are standard equipment. The engine is fitted with Boyle valves.

The brougham is finished in green with yellow and black stripe. Wood wheels are fitted to this model, which is on a 131-in. wheelbase chassis. Upholstery is in a gray wool material. The rear quarter windows are oval and landau irons are fitted.

A new Bauer taxicab model has three trimmed drop seats in place of the former two, and the interior is more comfortably arranged. In addition, the driver's compartment is entirely enclosed, and a somewhat larger space has been preserved for baggage. Access to the interior is made easier by the cutting away of the roof at the side of the driving seat. No price has as yet been fixed for this model, which, it is anticipated, will not be in production before June of 1926.

This year more than ever before attention seems to have been given to specific show merchandising problems. As in past years a huge meeting at which 1800 salesmen were present preceded the opening of the show better to prepare for their task the men who were to approach prospects. In addition, a large number of distributors held a series of special meetings for their salesmen, covering, in some cases, a period of several weeks preceding the exhibition, solely for the purpose of trying to make those salesmen capable of doing a real selling job during the show.

In arranging exhibits the plan of using a striking looking sport model of some kind in a prominent place to attract attention is used frequently. And in several instances the salesmen have been trained carefully in methods of transferring the interest of the prospect to the standard line once the sport job has attracted him to the booth.

Differing opinions about the best method of handling literature at the show still exist, of course, but there is a

noticeable general tendency to hold back the literature to some extent, in an attempt to get it into the hands of possible prospects and to keep it from being wasted on curiosity-inspired catalogue collectors as far as possible.

Stripped chassis and lecturers are present to a slightly greater extent than in New York. Sales talks in general, however, tend to emphasize the style, convenience and appearance features of the models. In most cases, also, the salesmen seem to have been trained to let the prospect take the lead in opening a conversation, that they then may follow up his general line of interest.

In addition to the usual range of hotel exhibits, the Chicago Automobile Salon is being held at the Drake Hotel. It is featured by an unusually large proportion of town cars and continued emphasis on bright coloring.

A large proportion of the exhibits duplicate those which appeared at the New York Salon in the middle of November, but several newcomers are present in Chicago including the British three-litre Bentley and some rather striking bodies on Marmon chassis by Robbins Body Corp. of Indianapolis. There were in all 20 exhibitors of whom six were car manufacturers, twelve custom body builders and two accessory makers.

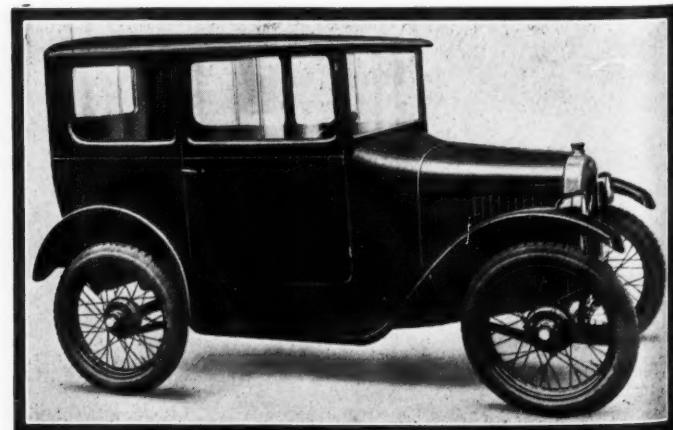
The car manufacturers exhibiting in their own name included Bentley, Cunningham, Duesenberg, Isotta Fraschini, Minerva and Rolls-Royce. Other chassis in the show on which the coachmakers showed their wares were Cadillac, Lincoln, Franklin, Locomobile, Marmon, Packard, Pierce-Arrow and Wills Sainte Claire.

Coachwork exhibitors included Brewster, Brunn, de Causse, Derham, Dietrich, Fleetwood, Holbrook, Judkins, Le Baron, Locke, Robbins and Willoughby. Accessories were shown by James Martin and the Specialty Manufacturing Co.

Austin Builds "Baby" Sedan

THE Austin Motor Co., Birmingham, Eng., has introduced a sedan model on its 7 hp. chassis, the latter having a wheelbase of 75 in., a tread of 40 in., and a four-cylinder engine of 45 cu. in. capacity. The body is built by the Gordon England Co., specialists in fabric bodies of a patented construction differing from the Weymann. The framework is rigid but light, with a flexible three-point mounting on the chassis. Accommodation is provided for two adults and two or three children.

The overall length of this miniature car is 102 in. and the overall width 46 in. Complete with tools and ordinary equipment, fuel, oil and water, the weight is 968 lb., while the price is £210. The open model Austin Seven with hood and rigid side screen equipment is £149.



New Austin miniature sedan

EDITORIAL

Workers and Management

AUTOMOTIVE thought about industrial relations and labor has taken a distinct turn in the last five years from the haphazardly philanthropic toward the effectively practical. Instead of managements trying to do things for the workers which the managements thought the workers ought to like, as was not unusual a few years ago, there is a far stronger tendency today to study the worker as a man and to so adapt conditions and methods as to give him an incentive to do those things which will be for his own as well as the company's benefit.

When the subject of labor comes up in an automotive group today little talk is heard about pig roasts, brass bands, baseball teams and cafeterias. These things are pretty well recognized now as pleasant frosting which is excellent if superimposed on the cake of psychological understanding, but they have little nutritive value in themselves.

Today the relative incentive value of various wage systems is discussed; practical methods of applying incentive methods to various types of work are argued, and the necessity for sane and consistently fair dealing between management and workers in their business relations is stressed.

The place of human fellowship in industrial relations hasn't been lost to sight, but a good bit of intelligent analysis is taking the place of both formula-seeking and sentimentality. The industry still is far from the end of the road so far as handling industrial relations is concerned, but it seems to be proceeding along reasonably sound lines in many instances.

Colors and Sales

THE automobile color artist has arrived. Today he is an important factor in the sales councils of automobile companies. It isn't to be inferred that manufacturers have just discovered the sales appeal of color, but it can be said that they have only recently begun to learn how to use colors with maximum effect, based on scientific principles. Instead of deciding haphazardly on color combinations for their cars and hoping that the effect will fascinate the buyer's eye, they are beginning to follow certain hard and fast color rules which have been developed through the ages by the master craftsmen in the realm of fine arts. Thus, as is always the case with an instrument which is fully understood, color is being better utilized and is being made to produce new results which are of far-reaching importance to the industry.

At the Annual S. A. E. Meeting in Detroit last week one of the most interesting sessions had to do with the effects which it is now possible for automobile manufacturers to achieve with color treatment. Not only can scientific blending of colors make an irre-

sistible appeal to the eye, thereby aiding tremendously in breaking down sales resistance, but by the application of certain color schemes the manufacturer can actually make a short car seem longer, or create the illusion that a car is lower than it really is. In these respects color is made to do what it would otherwise be possible to accomplish only by changing the entire design of the car with consequent changes in tools and production methods which would greatly increase the manufacturer's costs.

The automobile industry is also learning how to take advantage of color "styles" as promulgated by the fashion dictators of Paris and New York. Hence, when a new shade is introduced and popularized by garment, shoe and hat designers, its possibilities for adaptation to automobiles is studied. The modern motor car is thus being turned out in shades which capitalize the vogue of the moment, and this, especially where the woman buyer is concerned, is a sales argument of considerable value.

Cause of Road Corrugation

ALL those who do a good deal of driving have had experience with old tar-macadam roads that are in a wavy or corrugated state, which makes them exceedingly unpleasant to drive over. The question has been asked quite often as to what causes this wave formation, and up to recently, it seems, no satisfactory answer had been offered, at least none that had come to our attention. It was sometimes said in explanation that the road surface, that is, the top layer of the pavement, stretched under service conditions; that this was so was quite evident, as a wavy line between two points is longer than a straight line between the same two points, but no reason was given as to why it should stretch, and the explanation therefore did not really explain.

Recently the subject has been discussed at length at meetings of road builders in England and in the technical press, and the correct explanation seems to have been hit upon: The top tar-bound layer of the road is more or less plastic, especially in hot summer weather. A heavily loaded wheel forms a slight depression in the road surface, and, as it advances, the somewhat plastic material in front of it piles up. This increases the resistance to plastic flow, and soon a point is reached where the resistance to deformation becomes greater than the pressure between the wheel and the road surface, and the wheel then jumps over the mound or ripple which has formed in front of it and immediately proceeds to form a new one.

Road corrugation therefore is a consequence of the plastic nature of tar-bound surfacings and of asphalt. Since practically all of the newer roads are being built of concrete, this bane of the motorist will soon be a memory of the past.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Thursday, February 4, 1926

Car Production Speeded Up; First Quarter's Earnings to be Large

PHILADELPHIA, Feb. 4—Unusually good sales of motor cars for the season of the year continue to support the optimism with which leaders of the industry are considering the prospects for the year ahead. Production has been speeded up to record winter levels and is running ahead of sales, but not, apparently, to a dangerous extent. While dealers in some lines are carrying slightly heavier stocks than sound practice would dictate, the condition is by no means general. The producing companies should have one of the best first quarters in their histories, from the standpoint of net earnings.

Aside from the general prosperity of the country, the excellent market for automobiles is credited to the low prices of closed cars, which are normally in greatest demand at this time of year. There have been no price changes of particular significance since the closing of the New York show, and this stabilizing factor has helped to stimulate sales. The absence of blizzards severe enough to paralyze transportation has been another favorable influence.

Production Now Flexible

The heavy production schedules of the factories are regarded with less misgiving than has been the case in other years of similar tendency not only because of the good sales situation, but also because the producers were never before in condition to curtail at such short notice. Manufacturing processes have been speeded up so much during the last two years that most factories are able to shift from a high to a low production rate in approximately ten days, this representing the period between receipt of raw material and the assembly of the finished product. The time two years ago averaged about thirty days.

Cord President of Auburn Automobile

FT. WAYNE, IND., Feb. 3—E. L. Cord, vice-president and general manager of the Auburn Automobile Co., was elected president at the annual meeting at Auburn today. He succeeds J. I. Farley, who has disposed of his interests in the company and resigned.

Roy H. Faulkner, sales manager of the company, and Raymond S. Pruitt, Chicago attorney, were elected new members of the board of directors. Other members include President Cord, Rudolph Dard, of Chicago, and L. B. Manning. Retiring members are Mr. Farley and Judge James of Ft. Wayne.

The newly-elected president outlined a program of business expansion, an aggressive selling campaign, and increased output for 1926.

January Production Estimate is 333,727

Figure Represents Increase of 4% Over December—Exports Active

NEW YORK, Feb. 4—Continued strong activity in the automobile business is indicated by the production figure of 333,727 cars and trucks reported to the directors meeting of the National Automobile Chamber of Commerce at Chicago, yesterday. The total is estimated from shipping reports filed by the individual companies.

A conservative policy is being pursued, according to automobile leaders. The output is 4 per cent over December and 38 per cent larger than January of last year, but considerably under the heavy spring and summer schedules.

New Models Spur Sales

The interest in the 1926 models as exhibited at the Chicago and New York National Automobile Shows has led to a large number of immediate orders by dealers, which has made this January the most active that the business has ever enjoyed.

The record exports for December, totaling 58,000 motor vehicles, including foreign assemblies, give promise of an increasing trade in that field.

The production figures for 1924, 1925 and 1926 appear in the adjoining column.

The directors of the N. A. C. C. accepted an invitation to the Cuban Highway Congress at Havana, Mar. 11-12. Those selected to represent the Chamber were John N. Willys, Roy D. Chapin, George F. Bauer, and Alfred Reeves, general manager of the N. A. C. C.

New Davis Touring Car

CHICAGO, Feb. 4—The George W. Davis Motor Car Co. has added a five-passenger touring car to its series 93 line. The price is announced as \$1285.

JANUARY OUTPUT 38% UP FROM 1925

NEW YORK, Feb. 4—Monthly production figures, tabulated by the National Automobile Chamber of Commerce for 1924, 1925 and January, 1926, are as follows:

| | 1924 | 1925 |
|---------------------|------------------|------------------|
| Jan. | 324,565 | 241,062 |
| Feb. | 376,370 | 287,213 |
| March | 393,489 | 377,252 |
| April | 384,353 | 439,125 |
| May | 321,638 | 426,021 |
| June | 254,146 | 402,862 |
| July | 270,935 | 400,394 |
| Aug. | 283,879 | 259,601 |
| Sep. | 295,488 | 332,799 |
| Oct. | 293,356 | 452,486 |
| Nov. | 232,248 | 376,353 |
| Dec. | 209,641 | 319,468 |
| Totals | 3,640,108 | 4,314,636 |
| January 1926 | 333,727 | |

Tire Manufacturers Reduce Prices 10%

Firestone, U. S. Rubber, Goodrich Announce Lower Lists—Others Follow Lead

AKRON, Feb. 3—President H. S. Firestone, of the Firestone Tire & Rubber Co., announced late today a straight reduction of 10 per cent on all Firestone tires and tubes, effective Feb. 1. Dealers were notified at the same time that they would be protected against further possible price reductions on "spring stock" orders until July 1.

Mr. Firestone said he looked for a further decline in the crude market, which would be accompanied by more tire reductions. Firestone has frequently been a leader in any price changes in the industry, and officials of other large companies in the Akron district are preparing to meet the revised schedules. This is the first price cut put into effect for more than a year in the tire industry, and follows a drop in crude rubber from around \$1.10 a pound recently to near the 65 cent level within the last few weeks.

Tire prices were increased five times in 1925, as the result of the tremendous rise in rubber from 30 cents a pound to \$1.20, reached in July, 1925. Most Akron manufacturers were not prepared for this reduction, because they felt that crude rubber had not become sufficiently stabilized around the lower levels to

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Period of Sounder Credit Terms Here

C. C. Hanch Tells N.A.D.A.
Peak of Risky Financing
Has Passed

CHICAGO, Feb. 3—While sounding a warning against deviating from sound credit terms in the sale of cars, at the Ninth Annual Convention of the National Automobile Dealers Association here today, C. C. Hanch, general manager of the National Association of Finance Companies, expressed the belief that the tendency in this direction had passed the peak, so far as dealers and finance companies were concerned.

"If this situation is not upset by excessive competition among manufacturers, bankers throughout the United States undoubtedly will continue to lend large sums of money to prudently managed finance companies, so that a large production of automobiles may be continued, and the general prosperity of the Nation promoted." In the category of things that must be done to accomplish stability in automobile financing, Mr. Hanch included:

Factors Necessary to Stability

- Cooperation of manufacturers, dealers and finance companies with the approval and support of the bankers.
- Elimination of any tendency toward unsound policies or practices.
- Elimination of practices which do not offer an adequate profit to the dealer.
- Abandonment of the practice of giving and receiving rebates.
- Elimination of practices which prevent the dealer from freely functioning as an independent merchant.

Other speakers on the finance program included Emlin S. Hare, vice-president of Hare & Chase, who spoke on "Non-Recourse Protects Dealer Profits," and Charles E. Gambill, retiring president of the National Automobile Dealers Association and Hupmobile distributor in this city, whose subject was "Industrial Future Rests on Financial Safety."

A definite stand in favor of sound financing by the association with decidedly specific announcement of what it believes to be "sound financing" is expected before the close of the convention.

The convention program also includes a merchandising session, in which Edward Payton, market analyst; H. D. Bullock, sales specialist, and A. R. Kroh, sales promotion advisor of the N. A. D. A. are to participate.

Franklin Co. Wholesale Financing Rates Low

CHICAGO, Feb. 3—Reduced wholesale financing rates are made available to Franklin dealers through a plan recently put into effect by H. H. Franklin Mfg. Co. The factory finances 80 per cent of the wholesale price at the rate of 8 per cent per annum for a maximum period of four months. This plan is made possible

through an arrangement with the National Surety Co. which bonds the dealer. The charge covers insurance.

The plan was recommended to the Franklin dealer organization by S. E. Ackerman, sales manager, at a luncheon today at the Drake Hotel. W. B. Burruess, sales consultant of the N. A. D. A., and several members of the factory organization, including Ralph Murphy, works manager, H. H. Goodhart, advertising manager and E. S. Marks, chief engineer.

Paige-Detroit to Add to 6-72 Line

DETROIT, Feb. 4—Paige-Detroit Motor Car Co. will start production in March on a new combination coupe and open type four-passenger body to be called the cabriolet roadster, which will be an addition to the present Paige 6-72 line. The list price will be \$2295.

Jewett Addresses Dealers

CHICAGO, Feb. 3—The time may come when cities will find it advisable to legislate from its streets such motor cars as make traffic congestion through inability to accelerate rapidly or to stop quickly, Harry M. Jewett said at a dinner given to midwestern dealers by the Paige-Detroit Motor Car Co. here tonight.

More than 400 dealers attended the gathering at which H. Krohn, vice-president in charge of sales, presided. Mr. Jewett emphasized the trend towards smaller cars, of higher efficiency, in addition to outlining the chief merchandising features of the 1926 Paige and Jewett lines.

Tire Manufacturers Reduce Prices 10%

(Continued from page 196)

justify any change in the tire market for the present.

Later reports announced that the B. F. Goodrich Co. and U. S. Rubber Co. would meet the tire price cuts made by Firestone, and that other manufacturers were preparing to revise their schedules. U. S. Rubber cuts included one of 10 per cent on cord tires and tubes, and cuts of from 3½ to 7½ per cent on second-line tires.

White Co. Announces Chassis Improvements

CLEVELAND, Feb. 1—A number of improvements and refinements in its special bus chassis, which hereafter will be known as the Model 50-B, supplanting Model 50-A, is announced by the White Co.

One of the more important changes is the installation of Westinghouse air brakes as standard equipment. This type of brake makes it possible to use metal-to-metal friction surfaces in the rear wheel brakes, which tends to eliminate trouble from heating.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Feb. 4—Trade in most lines continues well above that of a year ago, despite the slackening which has been noticeable in the last week or two. Extremely cold weather is held partly responsible for the decline in sales at retail. Prices of stock and of commodities in general were firm last week, with advances predominating.

CAR LOADINGS

For the first time this year, car loadings exceeded the corresponding figure for 1925 in the week ended Jan. 16. The total was 936,655 cars, which compares with 934,022 a year ago, and 907,119 in the preceding week.

RETAIL STORES' SALES

Sales of retail stores in the New York Federal Reserve district in December were the largest on record. Department store sales for the entire year were 5½ per cent larger than in 1924, while the gain in sales of chain stores was 18 per cent, or approximately the same as the increase in the number of stores.

BUSINESS FAILURES

Business failures reported to Bradstreet's for the week ended Jan. 28 numbered 428, as against 507 a week earlier, and 509 a year ago. Failures reported to R. G. Dun and Co. in January numbered 2,296, or slightly less than the total of 2,317 in last January.

BANK DEBITS

Debits to individual accounts by banks in leading cities during the week ended Jan. 27 were 9.2 per cent below the total for the preceding week, but 13.5 per cent above that of a year ago.

BUSINESS INDICES

Fisher's index of wholesale commodity prices stood at 159.7 last week, as against 159.2 in the preceding week, and 159.3 four weeks earlier. The stock price index was 148, as compared with 146.8 a week before.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve Banks declined \$20,000,000 during the week ended Jan. 27, with decreases of \$4,600,000 in discounts, \$10,400,000 in open market purchases, and \$4,900,000 in Government securities. Note circulation declined \$24,800,000; deposits, \$26,100,000; and reserves, \$13,600,000. The reserve ratio rose from 74.4 to 75.0 per cent.

MONEY

Money rates in general were lower last week, with time loans at 4½ to 4¾ per cent, as against 4% to 4¾ per cent a week earlier, and commercial paper at 4 to 4½ per cent, as against 4% to 4½ per cent. Call money remained at 4 per cent until the latter part of the week, when the usual month-end tightening carried the rate to 5 per cent.

Views of Factory Executives at the Chicago Show

GEORGE M. Graham, vice-president of the Chandler Motor Car Co., was on hand and full of optimism as to the prospects of the automotive industry generally this year, particularly with respect to the outlook for Chandler.

No price changes were announced at the time of the show and none are planned.

PRODUCTION is being maintained at a high rate at the Olds Motor Works in Lansing, according to H. S. Wier, assistant general sales manager. Mr. Wier said the company is producing about 210 closed cars daily and that it is planned to step production up to capacity shortly. The output then is to be 230.

The entire February output of the Lansing plant has already been sold, according to factory representatives. There is no stocking on the part of the dealers, as the factory thus far has been unable to meet the demand.

REPRESENTATION of the Pontiac product of General Motors has been well established throughout the country, and many new dealers are being added regularly, according to W. M. Chamberlin, director of sales development of the Oakland Motor Car Co., Pontiac, Mich.

Additional sales schools are to be held throughout the United States, Mr. Chamberlin said.

ORDERS will force capacity production until June 1 by the Rickenbacker Motor Co., Detroit, according to H. A. Raseley, assistant sales manager.

"Our display at the National shows this year is being received better than ever before," declared Mr. Raseley. "We have taken a large number of orders for our regular line, and the new 'super-sport' has attracted so much attention that we believe now we will

be forced to make at least 400 of these cars this year."

GEORGE F. LORD, assistant to Vice-President Campbell Durant Motors, Inc., was on hand at the Congress Hotel prior to the opening of the show, where he presided at a meeting of factory representatives held to formulate selling plans in connection with the show. He reported that the demand for Star and Durant cars is of healthy proportions and that production is being maintained at a level consistent with the demand.

THE chief concern of Durant Motors, Inc., at present, he stated, is to increase its dealer organization.

So far as the situation generally with respect to 1926 is concerned, he looks for a healthy condition to prevail. No changes in prices of Star and Durant cars were announced at the time of the show, but so far as automobile prices generally in 1926 are concerned, he stated that, in his opinion, the trend likely would be upward.

H. M. STEPHENS, general sales manager, Cadillac Motor Car Co., was at the opening of the show Saturday morning and reported that at present there were fewer cars in distributors' and dealers' hands than ever before in the history of the company, adding that January would be the best initial month of the year with respect to deliveries to the public and to dealers and distributors that the company had ever experienced.

Mr. Stephens is of the opinion that 1926 is likely to witness some advances in price, due to rising costs of materials entering into construction. So far as Cadillac is concerned, no price increases were announced at the time of the show and Mr. Stephens is authority for the statement that none are contemplated in the immediate future.

French Car Production Reaches 205,000 in 1925

WAshington, Feb. 4.—With a production estimated at 205,000 passenger cars and trucks, the French automobile industry experienced its most successful year in 1925, Assistant Trade Commissioner H. H. Kelly, Paris, informs the Department of Commerce. Production increased approximately 55,000 units, or 37 per cent over 1924, and both domestic sales and exports rose in pro-

portion. No official statistics are ever announced for the production of the French industry, and all figures are estimates.

It is set forth as significant of the French industry that three firms accounted for 67 per cent of the total. Nine others produced 38,800 or 19 per cent. Since there are about 90 producing automobile firms in France, the balance of the total production, or 28,700 cars and trucks, was distributed among 78 companies.

New Trucks Seen at Chicago Exhibit

Products Shown Have Many Novel Features—Construction Details

CHICAGO, Feb. 3.—Sponsored by the hotel management, a delivery truck show was opened February 1 at the Hotel Sherman to run concurrently with the automobile show. This occasion was taken advantage of by two manufacturers to introduce new products, one being the novel Pac-Age-Kar, built by the Pac-Age-Kar Corp., and the other a speed truck added to the Diamond-T line.

The Pac-Age-Kar engine and gearset are located at the rear end of the chassis, and the drive is taken to each rear wheel by a separate shaft and worm gear.

Designed for 2,000-lb. Load

Designed to carry a 2,000 pound load, the body capacity is 216 cu. ft., measuring 6 ft. high inside. The overall height, however, has been kept down to 7 ft. 3 in., while the wheelbase is but 95 in. With the 10 hp. engine, gasoline and oil consumptions are guaranteed at 40 m.p.g. and 800 m.p.g respectively. A two-speed forward and one reverse is incorporated, the normal operating speed being 15 m.p.h. Lacquered any color, the complete vehicle sells for \$850.

In designing the new model 76 fast 1-tonner, Diamond-T has not only made a strong bid for light delivery business but has put into practice its new policy of designing a truck that is as pleasing to the eye as a private car. An aluminum radiator shell, with a cellular core, Biflex bumper and hollow-spoke steel wheels carrying 30 x 5 in. pneumatic tires give it a de luxe finish. The engine is a Hercules 4 x 5 in., with special aluminum connecting rods, although cast-iron pistons are retained.

T4 Model Also Shown

Another model shown was the T4, a 1½-2-ton job, which has been on the market about a month. This had a low-sided body and a 3-man totally enclosed cab. The third exhibit was a de luxe delivery vehicle, part of an order for Marshall Field's. This was mounted with a \$2000 panel body with enclosed driving compartment having half-doors.

Other delivery jobs shown were, Yellow-Knight 1-tonner, a Commerce super-7 open-side truck and a metal panel job. Ford screen and panel models, International 2000 lb. side-entrance milk truck and panel vehicles, the Stewart "Buddy," and a LeMoon 1-tonner. The latter company also exhibited the Milburn electric, which they manufacture. The Hendrickson company was represented by a 3-ton chassis, and American LaFrance by a model 2R 2½-ton chassis.

Although not represented here, the Republic Motor Truck Co. and the Federal Truck Co. had exhibits at the Congress Hotel, in the form of polished chassis.

Automotive Exports Total \$374,000,000

Increase of 48 Per Cent Over
1924—Australia is Our
Best Customer

WASHINGTON, Feb. 4.—The United States and Canada, during 1925, exported automotive products valued at approximately \$374,000,000, which represents an increase in value of 48 per cent over the preceding year, it is announced here by I. H. Taylor, acting chief of the automotive division of the Commerce Department. Including foreign assemblies of American cars, there were 557,425 automobiles exported from the United States and Canada during the year, representing an increase of approximately 58 per cent over 1924.

The value of automotive exports during 1920, which held the record until now, due to high prices and inflated demand, was exceeded by more than \$70,000,000. Of the combined American exports, the United States accounted for more than \$334,000,000.

Automotive Products Lead

On the basis of this figure, automotive products in export trade for 1925 exceeded those of any other fabricated product, and their position was third among exported products of all kinds, being exceeded only by unmanufactured cotton and refined mineral oils.

If certain other manufactured products related to the automobile or intended for motor vehicle spare equipment, such as tractors, tires, storage batteries and magnetos were included, the total value of automotive exports would be very near \$400,000,000.

Passenger cars are the largest item making up the 1925 record figure, followed by parts and accessories, including engines. The value of trucks and buses exported from the United States during the year gained about 96 per cent; the increase in the value of United States passenger car exports is also remarkable, there being a gain of 64 per cent over the preceding year. The increase in the number of automobiles exported, although large, is less than the value increase, indicating an increasing tendency abroad towards more expensive types of vehicles.

Proportionate Gain Greater

An extremely pertinent fact brought to light in this study is that, while both production and exports reached higher levels last year, exports show a proportionately greater gain. In 1925 there were, including foreign assemblies of American cars, 4,494,986 passenger cars, trucks and buses produced in the United States and Canada, representing an increase of 712,532 units, or about 20 per cent, over 1924; whereas, as previously pointed out, the number of vehicles exported, including foreign assemblies, increased 58 per cent.

Australia in 1925 led as the major

Here and There at the Chicago National Automobile Show

WHEN the doors of the Chicago show were opened, Sam A. Miles, manager of these shows for 26 years, stood in the main hall a few feet from the entrance. Here, unnoticed by the crowds that poured through the gates, he watched the start of the show to be sure everything was moving smoothly. The smile with which he greeted the few who recognized him showed how well pleased he was.

A SPANISH setting was the choice of the show management this year for the Coliseum decorations. Brightly-colored bunting hid the bones of the bare old structure, and the walls held murals representing Spanish garden and landscape scenes. It was a perfect background for the flashing hues of the new cars.

AMONG notable features of many of the car booths was that the salesmen were decorated with ribbons bearing the names of their cars. It helped curious visitors to pick out the men who could answer their questions.

ONE thing that strikes the seeker after information is that some of the salesmen might be better provided with answers to all the questions that are most likely to be asked. Shortly after the opening, men were found who did not know the prices of their cars and had to scurry around to find out.

THE latest rumor, acquired under one of the stairways at the Coliseum, is that earliest possible preparations will be made to render next year's trade-days bigger and better. While the days at the New York show were not regarded as unsatisfactory, it is felt that a great deal more can be done with proper preparations and plans.

THE Chicago Stutz organization has set out to sell at least 300 cars during the show. Their ambition is to surpass the record of any other show. Sales reported at New York, during show week, were 175, at Philadelphia 177, at Milwaukee 36, at Cincinnati 17, at Columbus, Ohio, 8; at Kalamazoo, Mich., 7. The Stutz company is rapidly increasing its dealer organization and expects to sign several new contracts this week.

A PRE-SHOW dinner was tendered by the Chicago branch of the Cadillac Motor Co. to dealers and salesmen at the Blackstone Hotel, at which sales plans in connection with the show were discussed and the salesmen schooled with reference to the selling methods to be used in connection with the approach to prospects developed at the Coliseum.

Charles F. Kettering, president, General Motors Research Corp., gave a history of the growth and development of the Cadillac company, and a sales talk was made by H. M. Stephens, general sales manager of Cadillac.

GENERALLY speaking, dealer organizations appear to be on the increase. Nearly all the more important companies report increases in this respect since the first of the year. This may account to some degree for the abnormally high production rate at the factories. With more dealers, more cars can be shipped without overloading the retailers.

WITHIN four minutes after the Chicago show opened, Floyd D. Cerf, manager of the Chicago branch of the Stutz Motor Car Co., had sold one of the new Stutz cars at the Stutz booth. The purchaser was John F. Tyrrell, a Chicago lawyer.

market for American motor vehicles, while Japan, which was the leading market for our trucks in 1924, was not among the first twenty-three markets in 1925.

Rickenbacker Luncheon Held

CHICAGO, Feb. 3.—The Rickenbacker Motor Co. today held its first luncheon for midwestern distributors and dealers at the Blackstone Hotel. Capt. E. V. Rickenbacker, vice-president, presided. Executives of the company who outlined

policies and methods to the dealers included B. F. Everitt, president, C. M. Tichenor, production manager, R. T. Hodgkins, sales manager and E. Leroy Pelletier, advertising manager.

Forrestal a Director

NEW YORK, Feb. 4.—J. V. Forrestal of Dillon, Read & Co., has been elected a director of Niles-Bement-Pond Co., to fill a vacancy. Other officers and directors were re-elected.

Question Non-Voting Stock Applications

N.Y. Stock Exchange Will Give Careful Thought Before Admission to List

NEW YORK, Feb. 1—Increase of the practice of issuing large amounts of non-voting stock, common to automobile as well as other concerns, has reached a point where the New York Stock Exchange announces that, in considering applications for listing, it will give careful thought to the matter of voting control. The Exchange is reported to have held up the listing of two new issues for this reason.

Opponents of the non-voting stock custom say that it enables bankers, directors and a few managing officials, with comparatively small investment of their own, to control absolutely properties worth millions; and it is held that non-voting stockholders should at least be clothed with reserve power to take charge of their companies when things are not going well.

Proponents of the present system point out that the great majority of stockholders give little or no thought to the powers bestowed upon them by ownership and seldom exercise their voting rights and that in the active management reputable bankers and business men do not risk their reputations by handling the capital of other people in any way which would justify a demand for a larger diffusion of voting ownership as a means to protect the business from mismanagement.

U. S. Motor Truck Co. Had Prosperous Year

CINCINNATI, Feb. 4—At the annual meeting of the stockholders of the U. S. Motor Truck Co., Charles L. Costello, who has been associated with the company for many years, was elected vice-president and general sales manager. Mr. Costello came here from Boston 12 years ago. He was originally associated with the Fisk Tire Co., and then became manager of the Citizens Motor Car Co., from which position he went to the U. S. Motor Truck Co.

The annual report of the officers shows that the company is in better condition than at any time in its career. Capital stock is \$1,750,000. The report of the export department shows that sales during 1925 were made in 20 foreign countries.

Fitzjohn Co. Shipments 100% Over Jan., 1925

MUSKEGON, MICH., Feb. 3—Shipments of bus bodies by the Fitzjohn Mfg. Co. in 1925 were exactly 100 per cent larger than for 1924, George H. Hermanson, sales manager, said today.

Of the total number of bodies, 51 per

cent were represented by the Standard pay-enter streetcar type used for city service, 37 per cent were inter-city coaches of the semi-streetcar type and 12 per cent, parlor coaches for inter-city work.

The 21-passenger capacity body seemed to be in the largest demand, 89 per cent of the total number of bodies manufactured being of this type. The balance consisted of bodies having 12 and 15-passenger capacity.

According to Mr. Hermanson, shipments for January have doubled the shipments for January a year ago. The outlook for 1926 is regarded as favorable, with the first six months being especially strong.

DuPont Holdings in G.M. 25.8% of Total

NEW YORK, Feb. 4—The annual report of the E. I. duPont deNemours & Co., Inc., shows that this company's holdings in General Motors common, with its equity in holdings of General Motors Securities Co., constitute about 25.8 per cent of the entire General Motors Corp. common. These holdings aggregate 1,330,829 shares, which equals the number of duPont common outstanding. In 1925, the company received \$9,296,706 in General Motors common dividends.

The report adds that preliminary estimate of General Motors indicates that earnings on its common plus accrued earnings in Fisher Body Corp., General Motors Acceptance Corp. and Yellow Truck & Coach Mfg. Co. were about \$20.60 a share in 1925; hence, there has accrued to the duPont concern total earnings received and accrued on General Motors common amounting to \$27,395,106.

In 1925, \$8,000,000 par value of duPont stock was sold to General Motors Corp.

Stewart-Warner Corp. Doubles Net Income

CHICAGO, Feb. 1—The Stewart-Warner Speedometer Corp. and subsidiary companies report net income, for the year ended Dec. 31, 1925, of \$7,544,089, as compared with \$3,501,107 in 1924. These figures are given in a preliminary report just made public here.

Earnings per share of common, based on 599,990 shares outstanding, are reported as \$12.57, against \$5.84 in 1924.

Pioneer Rubber Changes Deficit Into Surplus

WILLARD, OHIO, Feb. 1—At the annual stockholders' meeting of the Pioneer Rubber Co., a statement was issued showing that a deficit of \$71,000 of three years ago has been turned into a surplus of more than \$88,000 at this time.

Net earnings of the company last year exceeded \$100,000, and, while dividends were again passed, President T. W. Beelman stated that dividends would probably be resumed next year.

FINANCIAL NOTES

American Bosch Magneto Corp.—This company last year, after all charges, earned about \$500,000, against \$107,000 in 1924, or \$2.41 a share against 77 cents in the preceding year.

During the year the company increased its stock 50 per cent to retire its \$200,250,000 8 per cent notes. This represented an interest charge of \$180,000, or almost 90 cents a share on present capital. As a result of radio business, net for the last three months was \$225,000, or \$60,000 more than in the second quarter. In the last 21 months, \$3,800,000 of floated and funded debts has been eliminated.

Mullins Body Corp.—This company, for the year ended Dec. 31, 1925, reports gross profits on sales of \$646,859, compared with \$543,249 for 1924. Surplus for the year amounted to \$209,532, against \$222,355, after Federal taxes, preferred dividends and charges. Earnings per share, based on 9,640 preferred and 100,000 common shares in 1925 and 9,660 preferred and 100,000 common in 1924, were \$29.74 on the preferred in 1925, as compared with \$31.03 in 1924, and on the common in 1925 of \$1.95, against \$2.11 in the preceding year.

New York Stock Exchange—This exchange has added to its list: Electric Auto Lite Co., 250,000 no par common; Lee Rubber & Tire Corp., 85,163 no par common; Omnibus Corp., 8,810,800 8 per cent cumulative convertible preferred, with authority to add \$32,810 and \$1,795,190; also voting trust certificates of 592,181 common shares with authority to add \$667,174 and 30,000 shares.

Motor Products Corp.—Stockholders of this company have approved the plan for reorganization. Holders of preferred will be offered for each share a share of preferred in the new company, carrying dividends at the rate of \$5 a share and redeemable at \$60 a share. Holders of common will be entitled to receive two shares of new common for each old share held.

Houde Engineering Corp.—This company reports that its wholesale sales of Houdaille shock absorbers to car manufacturers for original equipment for use on cars already in service gained 45 per cent. Sales for the first 20 days of January were more than 100 per cent larger than all of January, 1925.

Cleveland Automobile Co.—This company has called for payment on April 1 its entire outstanding issue of \$1,155,300 8 per cent preferred stock at \$1.05 and accrued dividends, in connection with its consolidation with the Chandler Motor Car Co.

Continental Motors Corp.—Directors of this company, including R. W. Judson, president, and W. R. Angell, executive vice-president, have been reelected.

Martin-Parry Corp.—This company has declared quarterly dividend of 50 cents, payable Mar. 1 to holders recorded Feb. 15.

Electric Auto Lite Co. and subsidiaries.—For the four months ended October 31 these companies report net income of \$852,882.

Organization of Bus Industry Effected

A.A.A. Governing Board Also Considers Interstate Regulation by Commissions

WASHINGTON, Feb. 4—Preliminary arrangements for permanent organization of the huge bus industry of the nation were completed this week at a meeting here of the governing board of the bus division of the American Automobile Association. Ralph W. Sanborn, of Cleveland, was elected chairman of the board.

Practically the entire meeting was devoted to consideration of pending legislation for the regulation of buses operating in interstate commerce. The Cummins bill is now pending in the Senate, and Representative Parker, New York, chairman of the House Interstate and Foreign Commerce Committee, has introduced a similar bill in the House.

Backed by R. R. Interests

Both measures provide for control of interstate bus traffic by state public utilities commissions, under general direction of the Interstate Commerce Commission. The bills have the backing of the railroad interests. No date has been set for hearings on the bills in either branch of Congress, and there is little likelihood that they will be acted upon by the committees before the end of the month.

An official legislative committee was appointed by the bus division board to represent the bus interests in connection with the pending legislation. The new committee will replace the unofficial committee which represented the bus operators during early stages of the discussion. The committee is headed by S. A. Markel, of the Motor Bus Association of Virginia.

The board reviewed the Cummins bill and decided on several amendments to protect the interests of the bus operators. The amendments will be broadcast through state bus associations, and a conference will be held soon with railroad representatives to ascertain if an agreement can be reached before hearings begin at the Capitol.

Argentina Imported 40,000 Cars in 1925

WASHINGTON, Feb. 4—Argentina imported approximately 40,000 passenger automobiles during 1925, according to a brochure on "Argentine Markets for United States Goods," just made public by the Latin-American division of the Department of Commerce. In 1924 Argentina imported 35,688 passenger automobiles and 4,673 trucks, which made it a record year in automotive importation. The 40,000 prediction for 1925 is made on the basis of the betterment in dollar exchange which has enabled car importers there to make fairly large reductions in local prices.

At the close of 1924, there were 125,

000 passenger automobiles, 10,000 trucks and 2,000 motorcycles in use in Argentina, the country holding seventh place among the nations as automobile users.

"The public demand," says the brochure, "is undoubtedly for American automobiles but it must not be thought that automobile sales are easy in Argentina. Competition is extremely keen among more than 50 firms, and a large share of the business is going to the established houses which have agencies in the principal towns, and whose cars have become well known by much advertising."

Pittsburgh Co. Buys London-Made Buses

LONDON, Feb. 3.—Two A. E. C. buses have been purchased by the Equitable Auto Co., Pittsburgh, Pa., from the Associated Equipment Co., the manufacturing subsidiary of the London General Omnibus Co. Apart from the staircase being on the right-hand side, instead of the left as in England, and entrances to the rear platform on both sides, the buses—chassis and bodies—are identical with the latest type used in London. Both seat 54 passengers, while one has the enclosed-top deck type of which a limited number were authorized for use in London a few months ago.

The chassis is as described, with general arrangement drawings, in *Automotive Industries* of Jan. 24, 1924, excepting that the three-speed gearset now has chains for the indirect forward ratios, instead of helically-cut gears. The rear platform is 13 in. above the ground. Final drive is by worm and internal gears.

Hoist and Dump Makers Foresee Prosperous 1926

DETROIT, Feb. 2—The amount of money to be spent on maintenance of good roads and the additional sums authorized for the building of more highway mileage, plus the steel buying for truck makers, augurs well for the hoist and dump manufacturers for 1926.

This is the belief of Frank Dewey, assistant general manager of the Wood Hydraulic Hoist and Body Co., who spoke to some 35 branch managers and distributors attending the annual convention here this week.

Nineteen twenty-five exceeded by 20 per cent the best year in the history of the company, Mr. Dewey said, and the outlook for 1926 with orders which have already been received forecasts an even better year.

Warren N. A. D. A. Head

CHICAGO, Feb. 3—Charles B. Warren, president of the Warren-Nash Co., New York, has been elected president of the National Automobile Dealers Association for the ensuing year. William L. Hughson, of San Francisco, was chosen first vice-president.

Federal Aid Policy Must be Maintained

Senator Fess Urges Money be Expended on Public Highways

WASHINGTON, Feb. 4—To scrap the Federal aid policy of the Government at this time, according to a statement made here by Senator Simeon D. Fess of Ohio, would be nothing short of National disaster as it would destroy the principle underlying the building of a highway system on a plane sufficiently broad to meet not only transportation needs but also to assure the social and economic cohesion of the country.

Among the points stressed by Senator Fess are the following:

1. From the Constitutional standpoint Federal aid is clearly a Government obligation, as it is vitally linked up with National defense, transmission of the mails, the furtherance of commerce between the states and the promotion of the National welfare.

Not a Discriminatory Measure

2. It is in no wise a discrimination against wealthy states but a fitting appropriation to a public necessity, indisputably National in character.

3. The benefits from Government cooperation are National and not sectional and every state takes advantage of every cent available under the law, the eastern states benefitting to an even greater degree because of their dense population.

4. Federal aid has not led to extravagance nor has it tended to undermine state and local initiative, the latter fact proved by figures showing that the states have built independently more miles of highway than they built with the help of funds from the Treasury.

5. The policy assures that the building of interstate roads will continue on a high plane of standardization.

16,017 Miles Under Construction

The balance of the Federal Aid Fund available for new projects as of December 31, 1925, is given as \$119,771,201.42 in a statement just issued by the bureau of public roads, Department of Agriculture.

The statistics further show that 16,017.2 miles of roads are now under construction in the various states and Hawaii, costing \$385,565,266.84, of which \$164,547,107.97 in Federal aid was allotted.

A total of 1,794.3 miles of road projects have been approved for construction at an estimated cost of \$44,638,129.78, of which \$15,355,546.19 in Federal aid has been allotted.

Projects completed between June 30, 1925, and December 31, 1925, are given as totaling a cost of \$101,326,796.31, of which \$48,046,798.42 in Federal aid was allotted. These projects covered 5,078.3 miles.

E. E. Arnold Resigns

NEW YORK, Feb. 2—Ernest E. Arnold has resigned as sales manager of the HoffMetal Products Co. of this city.

93,000 Nash and Ajax Cars in 1925

KENOSHA, WIS., Feb. 2—Nash Motors Co., for the 12 months ended Nov. 30, enjoyed the most profitable year in its history. Throughout the year, according to the annual report, demand exceeded plant ability to supply, and peak production was maintained, except for a short period in the late fall, when there was a slight curtailment for rearrangement of machinery and installation of additional facilities.

The report, covering Ajax Motors Co. as well as Nash, shows that more than 93,000 cars and trucks were sold through a dealer organization of increasing size, and there was an increase of 114 per cent in foreign business.

Inventory as of Nov. 30 was somewhat larger than a year ago, but, when considered in relation to increased operations and the tendency of market prices, is regarded well-balanced and conservative. The company was again able to turn its

inventory twelve times during the year.

Net profits were \$16,256,216.02 and the only indebtedness, except reserve for taxes, was \$3,876,299.66. Current assets were \$42,530,744.78, and surplus was \$25,077,872.19 compared with surplus of \$14,240,965.17 as of December 30, 1924.

During the year the company purchased for retirement \$6,966,800 of its preferred stock in anticipation of retirement from its preferred on Feb. 1. The amount of preferred still to be retired is \$8,038,400.

The company paid \$5,419,309 in dividends and closed the year with \$23,946,128.86 cash on hand, after setting aside funds for retiring the preferred Feb. 1.

Willys Authorized to Buy Preferred Stock

NEW YORK, Feb. 4—At a board meeting here today, President Willys of the Willys-Overland Co., was authorized to buy \$3,727,560 Willys-Overland preferred stock. Purchase of this stock will bring redemption fund up to date, and, when completed, will clear the way for common dividends.

Peerless Output Shows Large Gain

CLEVELAND, O., Feb. 1—Production of Peerless Motor Car Co. up to Jan. 25 was 200 per cent above the Jan., 1924, total, according to the management.

L. D. Sasser, branch manager at Kansas City, has been appointed sales specialist at the home office, succeeding Walter Zimmerman, who is now export department manager.

Firestone Adds Plant Unit

AKRON, Feb. 4—The Firestone Tire & Rubber Co. has just awarded a contract for construction of a fabric warehouse, adjacent to its No. 1 plant, which will cost between \$175,000 and \$200,000. It will be 120 x 150 ft., and four stories high.

This is the second large factory building to be started recently by Firestone. Construction of a warehouse for finished products is now nearing completion.

Developments of the Week in Leading Motor Stocks

NEW YORK, Feb. 4—Prices on the New York Stock Exchange backed and filled rather aimlessly this week, the only movements of consequence occurring in the shares of specialty issues where developments affecting specific issues have been used to stimulate speculation.

In a season of traditionally irregular markets, the financial community has been wont to ascribe the prevailing irregularity to the prospective publication of figures by the Federal Reserve banks in cooperation with the New York Stock Exchange, showing the amount of credit being used by brokers. It may safely be assumed that this is an excuse rather than a reason, and that leaders are awaiting more definite indications of the trend of business before assuming an active position in the securities markets.

It is true that the closing days of last month and the first day of this month, saw a decidedly stiffer tone in the money market. This is usual and due to month-end requirements. The call money rate advanced to 5½ per cent during this period of temporary demand, but this rate was in force only twenty-four hours and receded to 4 per cent. Some indication of the increased demand for funds was apparent in the reduced reserves reported by the Clearing House banks and the making good of this shortage resulted in the calling of some \$50,000,000 of loans in the early days of this week. It is worthy of note that several issues of Government bonds established new high levels at the very time that call money rates were hardening, thus giving tangible evidence of the underlying strength of the credit position and the superficial nature of the call money demand.

Without any spectacular movements, the motor group was strong and the trend

of prices was toward higher levels. General Motors was the leader in strength and activity. In connection with the sharp advances recorded on one or two days, there were intimations of the stock being established on a permanently higher dividend basis, reports which were decried by banking interests close to the company. In these quarters it was suggested that the strength of the earnings and asset position of the company, combined with the brilliant prospects for business this year, were sufficient reasons for absorption of the stock by those who were looking to the future rather than to day-to-day fluctuations in the price.

Jordan Shares Strong

Jordan Motors was strong and held at about its recent high level. It would be difficult to say whether the buying was due more to the optimistic expectations of President Jordan, expressed just prior to his sailing for Europe, or to reports of control passing to Hudson Motors. The latter rumor was not taken too seriously, but unquestionably served to bring in some speculative buying.

Hudson Motors made some further recovery during the week, but elsewhere price movements were restricted, although the undertone generally was strong.

Accessory companies' stocks were irregular, spasmodic activity reflecting the mood of floor traders rather than any definite priced trend. There was similar irregularity in the tire and rubber group.

Not without interest to the automotive industry was the strengthening position of the oils as shown by advances of from 10 to 25 cents per barrel in the prices of Mid-Continent crude. The two industries are so closely allied and each is

dependent in so large a degree upon the other, that developments are watched by the leaders of each very closely. It is known that important interests in the oil industry are not in favor of substantially increasing prices of crude oil, first, because a high price for crude induces over-production, and, consequently, results in demoralization, and, second, because they believe that a stabilized price on a fair profit margin will result in larger sales. The automobile industry naturally favors low-priced gasoline, and, to the extent that a fair price is established, which will encourage consumption, it, too, would prefer to see a stable price basis established.

The impression has gone abroad that the Federal Reserve figures on brokers' loans would be made public early this week. These figures will be issued by the Reserve Bank authorities through the medium of the bank bulletin which ordinarily is issued about the 10th of the month. It is probable that the value of these figures has been exaggerated and that they will afford nothing more than a somewhat more accurate basis for estimating actual figures. Thousands of people carry stocks with their own banks in cities which do not have a Clearing House system and with banks which are not members of the Federal Reserve. These figures, of course, are not available to the public. The real crux of the situation lies not so much in the total of brokers' loans as in the amount of loanable funds throughout the country, and these are not easily determined. While they have been reduced somewhat in the last year, banking authorities estimate them at slightly above normal, and this ease of credit is shown by the flow of new funds into bonds.—H. H. S.

Automotive Steel Demand Sluggish

Mills Irked by Hesitation in Placing Orders—Rush Expected Later

NEW YORK, Feb. 4—A veritable smoke-screen of propaganda for earlier anticipation by automotive steel consumers of their requirements is being raised by steel mill sales managers who have grown impatient with the leisurely manner in which automotive purchasing agents place their orders. Spokesmen for the steel mills contend that every trifling order for automotive steels is accompanied by a solicitous inquiry as to whether steel producers will "take care" of automotive consumers once the generally hoped-for buying rush by automobile sets in. Steel sellers would like to have the automotive consumers understand that the best way to avoid neck-of-the-bottle conditions later on is to prepare against them by placing more liberal orders now.

Automotive purchasing agents have become so accustomed to hand-to-mouth buying methods that they prefer to take their chances on being disappointed later on to changing over now to a method of committing themselves for steel they might or might not need two or three month hence.

Some Justice on Both Sides

In all candor, there is much to be said for both attitudes. Steel producers say the pendulum has swung too far. Consumers expect steel ordered by them today to be shipped to-morrow at yesterday's price, and if they do not care to assume reasonable risks in ordering standard material far enough in advance to permit the producer to spread his operations over a sufficiently long period, they must not be disappointed if there comes a jam in both deliveries and prices.

On the other hand, automotive consumers say they cannot afford to be caught again with stocks of high-priced steel when the market flops, as it did during the slump that came in the wake of the post-Armistice boom, and that mills' capacity for producing automotive steel requirements has so expanded that, with efficient operating methods, steel mills should be able to take care even of the peak demand without causing any congestion.

Demand Really Exists

The whole controversy comes down to a continuance of steel mill sales managers and automotive purchasing agents talking at one another, and things continuing to go on as they do now, until every one can sense that the demand for automotive steels exceeds the current supply. And then, talk or no talk, automotive consumers will pay through the nose for their unwillingness to take more chances now. In the end, it will amount to the same thing.

Pig Iron—Some slight improvement in

the market's tone is noted. Prices are unchanged.

Aluminum—So far as concerns the relations of automotive consumers with the leading producer, they have in no wise been modified or influenced by the continuing first-page newspaper accounts of one of the 57 varieties of investigations to which, the press says, the leading interest will be subjected. Regular customers are being cared for, as they always have been. Import conditions and prices are unchanged.

Copper—Demand poor. Brass prices have been lowered fractionally.

Tin—Somewhat lower levels are in evidence.

Lead—Demand and supply are well balanced. The market is steady.

Zinc—Poor demand has forced prices slightly lower.

British Lift Rubber Embargo on Exports

NEW YORK, Feb. 4—The Colonial Office in London announced Monday that the permissible export of rubber under the Stevenson Act would be raised to 100 per cent on that day, thus setting at rest any idea that there would be any revision of that decision more favorable to the consumers.

At the same time James Fairlie, editor of Central News of London, stated his belief that some of the recent weakness in London crude rubber prices had been caused by the conviction that permission to export part of the British plantation rubber accumulations was certain to be given in May, in addition to the increase of permitted exports to 100 per cent mentioned. If the latter increase is not sufficient, Mr. Fairlie believes that permission for releasing some of the accumulated stocks will be given.

Charges that American rubber manufacturers took advantage of the world's rubber shortage and high prices in 1925 by profiteering in automobile tire distribution are answered in detail in a statement just issued by the statistical department of a large Akron company. It is stated that tire prices now are 16 per cent below the 1914 level, and only slightly above prices prevailing in 1923. Continuing, the report states:

"An analysis of eight of the more popular tire sizes shows the total cost to tire manufacturers increased from the beginning of 1925 to the present 49.3 per cent. Selling price of the same tires increased 49.1 per cent."

"While 1925 shows satisfactory balance sheets for most rubber companies, these in no way make up for the heavy losses sustained over the five-year period prior to 1925. As a matter of fact, these materially heavy book profits may be wiped out, should the price of crude rubber drop greatly."

Joseph O. Stokes Dead

TRENTON, N. J., Feb. 1—The death last week is announced of Joseph O. Stokes, president, Thermoid Rubber Co.

Rubber Situation Causing No Alarm

Second-Grade Lines Flourish and "Spring Stock" Orders Stimulate Trade

NEW YORK, Feb. 4—Further indications of the effect of the rubber situation on the tire industry is seen in the fact that tire manufacturers are now laying special emphasis on their second-grade lines and that some makers are adding such lines, which sell at prices below first-grade.

Tire manufacturers in Akron see no cause for alarm in the present situation. Reports that there had been an entire cessation in buying in the trade since announcement of the rubber conservation program are exaggerated. The fact that tire production in the important factories is holding up at fairly good levels indicates confidence on the part of the manufacturers that a large potential market exists for the industry in 1926.

Goodyear Tire & Rubber Co. has added to its clincher Pathfinder line the popular sizes in both straightside high-pressure types and balloons, and has made changes in the design of the new tires. This line, described as second-grade, but fully guaranteed, sells about 30 per cent below the Goodyear standard allweather line. Radio Cord tires, formerly made only in 30 x 3½ size, are now available in all standard sizes. Another addition to the line is the Radio balloon. Dealers can sell these tires at a profit, it is said at the factory, for the same price or slightly lower than the big mail order houses, and have the added advantage of making immediate delivery to customers without freight charges.

Second-Grade Trend Temporary

However, Akron manufacturers say that this trend toward cheaper grades is only temporary, due to the present price situation, and that the real trend of the motoring public is toward the highest in quality tires.

Leading rubber manufacturers decided early this week to accept so-called "spring stock" orders from tire dealers as a means of stimulating sales. Orders are taken for immediate delivery, in most cases under a 60-day advance billing. Dealers also are protected on price changes for two months. It was explained that this practice probably will take the place of the proposed resumption of "spring dating." The price guarantee is believed to indicate that there will be no immediate cut in tire prices.

Trading on the newly formed Cocoa & Rubber Exchange in New York commenced actively on Feb. 2. More than two score foreign firms were represented at the opening. About 100 American firms made up the remainder of the membership. Trading is permitted for 15 months in the future.

Men of the Industry and What They Are Doing

Chevrolet Brothers Plan Expansion of Plant

President Arthur Chevrolet, of Chevrolet Bros. Mfg. Co., and his brother Louis, who is vice-president of the company, have purchased the building which the company has been occupying at Fayette and Tenth Sts., Indianapolis, for \$100,000.

The company plans to increase production this year by enlargement of the plant and installation of more machinery. Foreign markets have been established, notably in South America, England, France, Spain, Italy and Japan.

The plant of the Frontenac Motor Corp. is part of the Chevrolet Bros. Mfg. Co.'s plant, and specializes in gears, flywheels and the "Fronty" motor head.

Dougherty and Meyer Promoted

Two important offices of the United Alloy Steel Corp., Canton, Ohio, have just been filled by the appointment of R. H. Dougherty as assistant general manager, and F. H. Meyer as general superintendent of operation.

Jamieson Moves to Springfield

Gen. C. C. Jamieson of New York City, chairman of the board of The American Bus and Truck Co., which recently took over the property and business of The Kelly-Springfield Motor Truck Co., arrived in Springfield, Ohio, recently and plans to remain at the plant. He will make Springfield his permanent home. Production of the Kelly Truck is well under way to fill orders.

St. Ledger With Thompson, Inc.

E. G. Thompson, vice-president and general manager of Thompson Products, Inc., Cleveland, announces the establishment of a factory branch and warehouse at 139-41 Fremont St., San Francisco, in charge of Joseph G. St. Ledger, formerly with the American Gear Co., and under the supervision of Al Vinton, district manager.

Elect Continental Officials

At the annual meeting of the board of directors of Continental Motor Corp., Detroit, the following officers were elected:

R. W. Judson, president; W. R. Angell, executive vice-president; W. A. Frederick, vice-president in charge of engineering; R. M. Sloane, treasurer, and T. M. Simpson, secretary.

Joseph With Cincinnati Co.

John Joseph, formerly associated with the B. F. Goodrich Co., Akron, is now vice-president and general manager of the Cincinnati Rubber Mfg. Co.

Harvey and Mills to Travel

Lynn Harvey, divisional sales manager for The India Tire & Rubber Co., has left for a two months' trip to the Pacific

G. M. OFFICIALS VISIT REMY CO.

President Alfred P. Sloan, Jr., and other officials of the General Motors Corp. inspected the Remy Electric Co.'s division plants in Anderson and Muncie, Ind., last week. They also looked over additional real estate acquired here recently for expansion of the Remy plants.

The object of the inspection tour was primarily to dedicate the formal opening of Plant 4, which took place Jan. 28. More than 3,000 persons attended. Pres. Sloan made the principal address, while most of the visiting officers and Mayor F. M. Williams also spoke briefly.

Among the visiting executives were Vice-President John L. Pratt; Vice-President James D. Mooney, in charge of exports; I. J. Reuter, president and general manager of the Olds Motor Works; Vice-President Donaldson Brown of General Motors Corp.; Harry H. Bassett, general manager of the Buick division; Lawrence Fisher, general manager of the Cadillac division; E. F. Johnson, in charge of the accessories division and assistant to Vice-President Pratt; W. S. Knudsen, general manager of the Chevrolet division; A. R. Glancy, general manager of the Oakland division; T. B. Fordham and M. M. Roberts, in charge of the Delco division; D. O. Thomas, in charge of the Muncie Products division, and others.

It was announced that E. R. Godfrey had been appointed manager of Plant 4. It is a building 250 x 529 ft., and 1,000 men are employed.

coast. J. B. Mills, special factory representative, leaves Feb. 1 for Cuba. J. N. Dunlevy, who joined the India organization recently, now becomes advertising manager and takes over the work in Akron formerly handled by Mr. Mills.

Jones Returns from Coast

J. F. Jones, general sales manager of the Mohawk Rubber Co., Akron, recently returned from a trip to the Pacific coast, where he visited all Mohawk branches and dealers. Prospects for spring and summer tire business were never better, he reports.

Herman With Lovejoy Co.

Frank P. Herman, of Boston, is now at Detroit representing the Lovejoy Mfg. Co. as contact man to secure factory equipment of the Lovejoy shock absorbers. He has opened headquarters in the General Motors Bldg.

Cadillac Co. Entertains Employees at Dinner

The Cadillac Motor Car Co., Detroit, has just held its annual "old timers'" dinner, to which were invited those who had completed five or ten years of service with the company.

Addresses were made by Lawrence P. Fisher, president of the company, and others of the company's executives. The men were presented with watch fobs and the women with rings bearing the Cadillac emblem—silver representing five years of service, and gold, ten years.

Rogers is Managing Director

Granville P. Rogers, New York, has been appointed managing director of the National Council of Lighting Fixture Manufacturers, whose general offices are in the Guarantee Title Bldg., Cleveland, Ohio.

Mr. Rogers has been active in trade association work and was formerly sales manager of the general automotive equipment department of Johns-Manville, Inc., and previously for several years general sales and advertising manager of the Pyrene Mfg. Co. He is a member of the Advertising Club of New York, the New York Sales Managers Club, Automotive Boosters Club of New York, and other business organizations.

Blasingham Succeeds Tremper

L. L. Tremper has resigned his position with the Indiana Truck Corp., Marion, Ind., as head of the purchasing and manufacturing departments, his resignation having become effective Feb. 1.

H. E. Blasingham, who has been connected with the good roads department of the Indiana Truck Corp. for some time past, has succeeded Mr. Tremper. He was formerly with the Haynes Automobile Co. and the General Motors Corp.

Allen and Taylor Sail

Ralph S. Allen, president of the Duratex Corp., Newark, N. J., and W. F. Taylor, vice-president in charge of sales of the corporation, sailed for Europe recently. Mr. Allen and Mr. Taylor will visit the various sales representatives of the Duratex Corp. in the principal cities of Great Britain and on the continent and will return to this country about March 15.

Lenz to Central America

Ernest W. Lenz, foreign sales manager, 280 Broadway, New York, is to leave for a trip to Santo Domingo, Porto Rico, Mexico and Cuba Feb. 18, to make investigations for several automotive equipment manufacturers. He hopes to get additional representation before sailing.

G.M. 1925 Earnings About \$114,000,000

Extra Dividend Unlikely, But
\$6 Common Dividend is
Expected

NEW YORK, Feb. 2—Declaration of an extra dividend at the General Motors Corp. directors' meeting Feb. 11 is considered unlikely although it is expected that during the first three months of 1926 the full year \$6 dividend on the common will be earned. In the past, extra dividends have been declared after the year's results were known or could be determined accurately. Current quarter earnings are said to be running considerably ahead of this quarter last year.

Preliminary estimates indicate 1925 earnings of about \$114,000,000 including the pro-accrued earnings in Fisher Body Corp., General Motors Acceptance Corp., and Yellow Truck & Coach Mfg. Co. After preferred dividends, this would equal \$20.60 on the common. In 1924 earnings were \$51,623,490, equal, after preferred, to \$8.59 on the common.

G. M. Truck Brings Out New Heavy-Duty Chassis

PONTIAC, Jan. 30—New heavy-duty 3½ and 5-ton truck chassis being brought out by the General Motors Truck Co. are the first new models to be introduced by the consolidated organizations of the General Motors truck division and the Yellow Cab Mfg. Co.

The striking frontal appearance of the two chassis models has prompted the name "Big Brute" for them. The 2½-ton GMC model is continued with modifications, and completes the heavy-duty line. Both the 1 and the 1½-ton chassis, introduced last spring, are continued without mechanical or price changes, but the prices on the heavy-duty line have been increased slightly.

Within a few weeks, the line will be supplemented by three truck-tractor models of 5, 10 and 15 tons' capacity.

Studebaker Car Plan Illegal in Wisconsin

NEW YORK, Feb. 1—The Studebaker car insurance plan has been held illegal in Wisconsin by Attorney General Herman L. Ekern of that state. He held that the money received by the Studebaker Finance Corp. was in part insurance money, and that the Wisconsin law does not allow insurance to be written by other than an agent authorized by the state insurance department.

On Mr. Ekern's ruling that Studebaker dealers cannot sell insurance unless licensed individually by the state, W. Stanley Smith, insurance commissioner, will refuse to allow the Home Insurance Co. to issue policies offered under the Studebaker plan. The Chrysler plan provides for a Michigan contract but

the Studebaker plan stipulates an insurance contract in Wisconsin.

A representative of the Home Insurance Co. has gone to Madison, Wis., to take issue with the attorney general's opinion. He asserts that Mr. Ekern has not properly interpreted his own law and that Studebaker dealers are not solicitors of insurance and cannot be construed as insurance agents.

Nordyke & Marmon Co. Effects Division

INDIANAPOLIS, Feb. 1—The Marmon expansion campaign for 1926 entered a new phase today when articles of incorporation for the two separate divisions of the concern were filed with the secretary of state, and the automobile division of the former Nordyke & Marmon Co. becomes the Marmon Motor Car Co., while the mill machinery manufacturing division is to be known as the Nordyke & Marmon Corp. The move was considered advisable by the company officials for greater efficiency and simplification of the business.

The officials of the newly-named motor car company are: W. C. Marmon, chairman of the board; G. M. Williams, president and general manager; H. L. Purdy, vice-president and assistant manager; A. R. Heiskell, vice-president and secretary; Howard Marmon, vice-president; Homer McKee, vice-president; C. J. Sherer, treasurer, and C. Badger, assistant treasurer.

According to G. M. Williams, president, the Marmon Car Co. starts most auspiciously under its new name with a production schedule involving the manufacture of more than \$12,000,000 worth of motor cars during the first six months of the year. This is based on actual orders booked up to June 1.

Reduction of Accidents Sought by Legislator

ALBANY, N. Y., Feb. 3—Charles A. Harnett, New York commissioner, has submitted to the legislature a bill extending from six months to one year the period of mandatory revocation of licenses.

He reports that last year a great majority of the 2,120 fatal accidents and the 54,398 injuries on the road might have been averted by respect for the law by pedestrians as well as drivers.

Of the total deaths, 1,484, or 70 per cent, were caused by automobiles, and these included 208 jaywalkers. Collisions caused 20 per cent of fatalities; speeding killed 150 people and injured 2,219; intoxicated driving killed 31 and injured 427; the driver who did not look behind to see if the way was clear killed 30 and injured 1,001.

The proportion of accidents due to types of vehicles was one accident for every 35 passenger cars, one for every 27 commercial cars, and one for every 4 taxicabs.

Distribution Needs Division of Labor

More Specialization by Wholesalers Needed, Banigan Tells Sales Executives

CHICAGO, Feb. 4—Trends of distribution in the automotive industry furnished the topic for an interesting and helpful conference of sales executives which was conducted by the Automotive Manufacturers Association tonight at the City Club. The principal address was made by Leon F. Banigan, editor of Motor World Wholesale, who pointed out, with the aid of several interesting charts, the tremendous growth of the automotive supply market in the last 10 years, and the effects of that growth on buying habits, and thus upon distribution methods.

"Division of labor," Mr. Banigan said, "came in the automobile industry, making production more effective and economical, and division of labor and specialization of distribution functions are coming in automotive marketing for the same purpose. This specialization may take the form of more wholesalers or more departmentization and specialization by existing wholesalers, or both. The final answer probably will be both."

Should Study Market Facts

In conclusion, he emphasized the necessity for more careful and consistent collection and digestion by individuals and associations of market facts, and for the application of marketing principles and practices based upon actual knowledge of market conditions and preferences.

A round table discussion of the subject followed Mr. Banigan's remarks, in which the following leaders participated:

Chas. F. Hudgson, Weaver Mfg. Co.—"The Kinds of Jobbers That Give Us Best Distribution of Shop Equipment, and Why They Are Able to Do So."

S. A. Fulton, The Fulton Co.—"The Distribution of Automotive Accessories, Now and in the Future."

George L. Briggs, sales manager, the Wilkening Mfg. Co.—"Factors Controlling the Distribution of Replacement Parts."

Alexander Johnston, editor, Automotive Daily News—"Relation of News to Production and Sales."

Company Changes Name

DALLAS, TEX., Feb. 1—The charter of the Dallas Wheel & Rim Co. has been amended to change the name to the Southwest Wheel & Rim Co., according to announcement of Fred Prior, president of the concern.

The Dallas concern has established branch houses at Houston and San Antonio and the president said the change in the name was made to prevent confusion.

Kettering Reviews Industry's Benefits

Salutary Effects on Other Trades the Result of Car Development

CHICAGO, Feb. 1—What is said to have been one of the largest local meetings of dealers and salesmen in the history of the industry was held last week in the Gold Room of Congress Hotel under the auspices of the Chicago Automobile Trade Association.

The meeting was presided over by C. E. Gambill, president of the association and president of the National Automobile Dealers Association.

C. F. Kettering, president of General Motors Research Corp., and H. C. Spillman, merchandising director of the Remington Typewriter Co., were the speakers of the evening.

Largest Industry in World

"With 20,000,000 automobiles in the United States," said Mr. Kettering, "and a production of well over 3,000,000 per year, the American public today is getting for its automobile-dollar merchandise of the highest known value. In twenty-five years the industry has developed from a curiosity to the largest in the world. The reason for this is that it has provided a mechanical method of transportation within the reach of all."

"The secondary results of the automotive industry are as great as the industry itself. Every line of human activity has been stimulated by it—steel, oil, rubber, fabrics, paints, copper, iron, chemicals and hundreds of others have been asked for materials of quality and quantity that have reflected the economies of increased production in every other line."

"Road building as an industry, and all other things that go with it, have assumed enormous proportions within the last ten years, and the real estate activities of every city show the effect of individual transportation upon the habits and prosperity of the people."

Following Mr. Kettering's speech, Mr. Spillman drove home the point that "no dealer has as good a sales organization as he has merchandise to sell." While horse-power has been developed to a stage of 90 per cent efficiency, he asserted that man power in merchandising has not advanced more than 10 per cent.

Proposes Agents Association

NEW YORK, Feb. 1—A proposal for the organization of a national association of professional manufacturers' agents,

Coming Feature Issues of Chilton Class Journal Publications

Feb. 10—Motor Transport—Complete Motor Bus and Truck Specifications.

Feb. 18—Automotive Industries—Statistical Number.

March 1—Chilton Tractor & Equipment Journal—Highway Number.

made by George R. Keith, San Francisco, representing manufacturers of automotive equipment and accessories, has been received by several agents here.

Mr. Keith believes such an association is necessary "to educate jobbers and manufacturers to believe in and co-operate with the properly functioning type of professional manufacturers' agents" as the "very finest connections they can make to do business with or through;" and "to realize that all persons selling on a commission, and perhaps with several lines, are not the real professional manufacturers' agents, and to distinguish the ones who are really high grade, successful and honorable merchandisers." Mr. Keith would make factory sales managers associate members. Asking for letters discussing the idea, he says: "Shall we organize? My money is up for any reasonable sum. What do you say?"

1926 Olympia Car Show to Open 2 Weeks Later

LONDON, Jan. 20 (by mail)—The passenger car show at Olympia this year will be opened a fortnight later than last year, viz., on Oct. 21, for the private view for the press and dealers, and on Oct. 22 for the public. As hitherto, the show will remain open daily (except Sunday) until the end of the following week. This period has been selected because the Paris show has been definitely fixed for the first two weeks of October.

There will be no truck show this year, but the motorcycle show will be held, the opening date being Oct. 4.

Comparative figures relating to the paying attendance at the 1923 and 1925 truck shows indicate a marked increase last year, the total being 65,476, as compared with 43,924 in 1923. There was no British truck show in 1924.

I.A.A.M.A. Allows Each Member a Show

Frequent Exhibits Tend to Interfere With Steady Production

BRUSSELS, BELGIUM, Jan. 19 (by mail)—A meeting of the International Association of Automobile Manufacturers Associations was held at Brussels recently. One of the problems discussed was that of regulating automobile shows. In recent years European manufacturers have been solicited particularly to exhibit their products at the numerous fairs, of which many are being held twice a year, and participation in such exhibits has been found to interfere seriously with steady production and distribution.

Penalties for Breaking Rule

It was decided at the meeting that there shall be only one automobile show in each of the countries represented, under the control of the manufacturer association having membership in the international association. Members of the national associations are enjoined from taking part in any other show; any infractions of the rule will be penalized, and, in case of necessity, the international association may take steps against offending firms.

Among the countries represented at Brussels were Belgium, France, England, Holland and Austria. The membership, in addition, comprises automobile manufacturer associations in Spain, Switzerland and Czechoslovakia. It was decided to re-admit the German Automobile Manufacturers Association, and an invitation to apply for membership will be addressed to that organization. The next meeting will be held in Paris toward the end of February.

Brazil to Impose Tax

WASHINGTON, Feb. 3—Tires and tubes, imported into Brazil, are to be made the basis of a newly-created consumption tax, which became effective Feb. 1, according to a cable to the U. S. Department of Commerce. The amount of the tax is not yet known.

The new order provides that stocks which dealers had on hand and were imported prior to Jan. 1 will be exempt from payment of the new consumption tax until June 1, 1926.

Calendar of Coming Events

SHOWS

Feb. 15-Mar. 15—International Automobile Show, Copenhagen, Denmark.

Feb. 20-28—13th Annual International Agricultural Exhibition, Brussels, Belgium.

Apr. 3-14—International Motor Car Show, Frankfort-on-Main, Germany.

CONVENTION

Apr.—American Gear Manufacturers Association, Detroit.

RACES

Feb. 22—300-mile race, Fulford, Fla.

May 1—Races at opening of new Speedway, Atlantic City.

May 30-31—500-mile race, Indianapolis.

June 12-13—Rudge-Whitworth 24-hour stock car race, Le Mans, France.